# WIRE AND WIRE PRODUCTS

DECEMBER 1934


Inter Plant **TRANSPORTATION** Intra Plant

i.e.

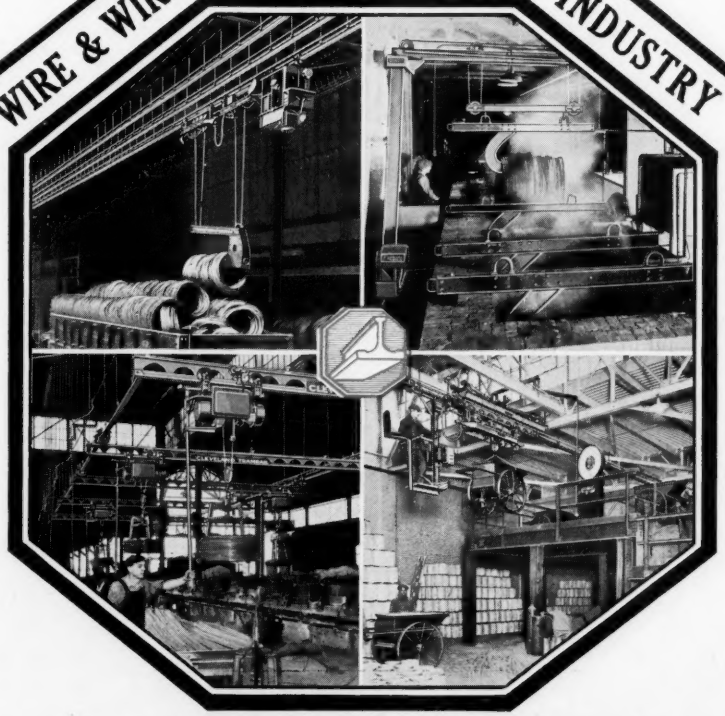
**HANDLING** and **CONVEYING**

by

CLEVELAND ——— TRAMRAIL

for the

WIRE & WIRE PRODUCTS INDUSTRY



THE CLEVELAND CRANE & ENGINEERING CO.

WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL CLEVELAND CRANES


OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

# THIS SIMPLE SPRING BUMPER SAVED $30.00 PER DIE

BEFORE installing this simple spring bumper on the job shown above, it was necessary to use a Carboloy die costing $51.00. After the bumper was installed, a smaller die, costing $20.80, did the job satisfactorily. Following this initial installation, these bumpers were applied more extensively until today this plant is making a very substantial saving in Carboloy die investment cost.

If your drawing blocks are of the quick starting type, making it necessary to use large Carboloy dies to withstand the heavy impact load each time the block is started, these spring bumpers may enable you to make a substantial saving in your plant also.

Without obligation we'd be glad to send you a descriptive folder and complete specifications for making these spring bumpers in your plant.

The Mark of CARBOLOY

**CARBOLOY COMPANY, INC.**

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**2985 E. JEFFERSON AVE., DETROIT**

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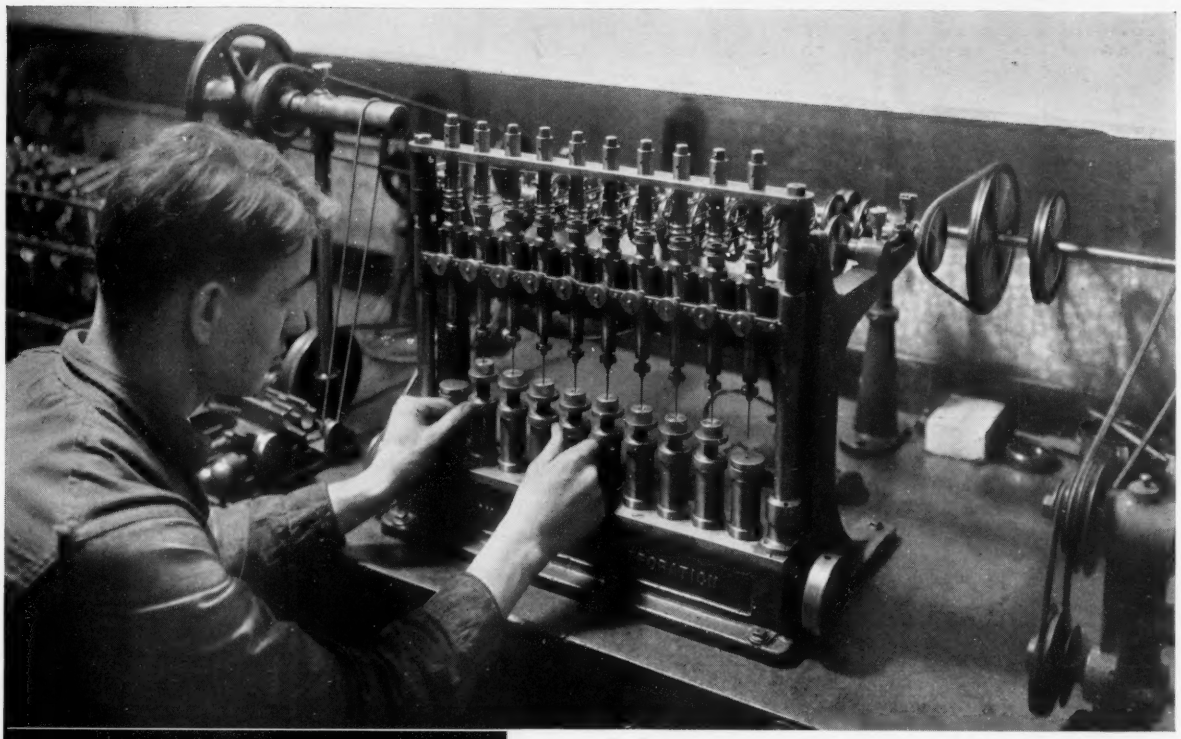
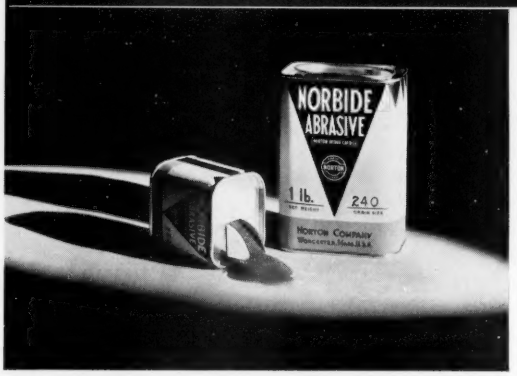


Photo Courtesy of Union Wire Die Corporation




# *Reduce Die Cutting Costs*

## with NORBIDE* Abrasive

NORBIDE* Abrasive—an important development by the Norton Research Laboratories—is the hardest material ever produced by man for commercial use. In the re-cutting of wire drawing dies it is showing remarkable savings. Because its cost is but a small fraction of that of diamond dust it can be used more generously. The result is a cutting action that is just as fast but at a greatly reduced cost.

Whether you are operating automatic machines like this ten-head ripper or hand machines, you'll want to use Norbide Abrasive. Full information on request.

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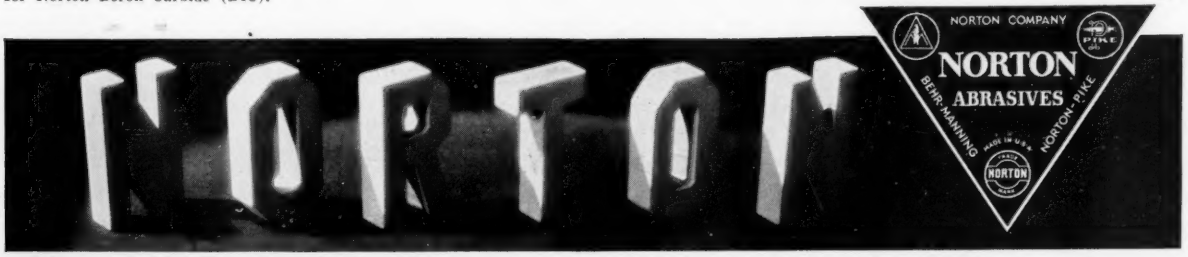
n-5



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## Specially Processed Copper Wire...

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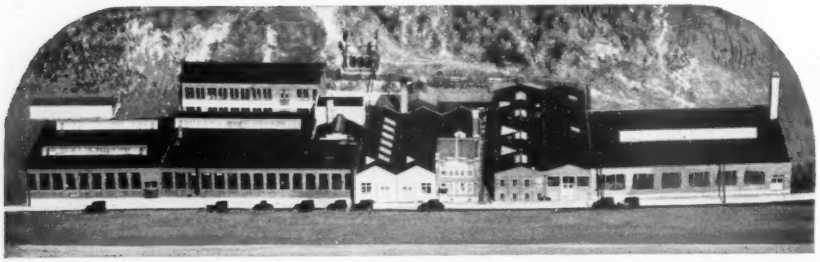

AERIAL VIEW OF PLANT OF HUDSON WIRE CO., OSSINING, N. Y. ▲ ▲ ▲
▼ ▼ ▼ FINE WIRE MANUFACTURERS ▼ ▼ ▼

### "HUDCO" High Conductivity Electric Wire

OTHER FINE BARE WIRES

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Brass, Steel, Nickel Silver, Copper and Phosphor Bronze

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Silver Plated Copper, False Gold and Copper

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ESPECIALLY MADE FOR METALLIZING

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Lead Alloy
Pure Zinc
Zinc Alloy
Copper
Tin
High Brass
Low Brass
Solder Wire
Cadmium
Nickel Silver (10%, 18%, 30%)
Aluminum
Monel Metal
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TROUBLE-FREE, dependable wire—made with extreme care to work perfectly with metal spray guns. Prompt shipment. Write for price lists. ▲ ▲ ▲

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## Leakproof Enameled Wire

and enameled wires in all Standard and Special Covering ▲ ▲ ▲
Made to meet the most exacting requirements ▲ ▲ ▲
THE WINSTED DIVISION OF HUDSON WIRE COMPANY, WINSTED, CONN.

**We can serve you quickly and economically.**
**Send in your specifications for a quotation.**

"HUDCO" FINE WIRES

## HUDSON WIRE COMPANY

Ossining, N. Y.

Successors ROYLE & AKIN

"HUDCO" FINE WIRES

Estab. 1902 Estab. 1902

# THE UNIVERSAL SPRING COILER

FOR twenty years the Universal Spring Coiling Machine has been the standard tool of the American Spring-maker. For that matter these machines have an international reputation as production tools. These coilers have been the basis of comparison of all coilers. Estimates are based on the production performance of the Universal.

✦ ✦ ✦

ELEVEN machines in the Universal line handling from .004" to ⅝" wire have in the past taken care of a great part of the spring production of this nation for many years. Machines, while not antiquated in our opinion, are still doing their work as they did 15 to 18 years ago.

✦ ✦ ✦

HOWEVER the new Universal line is far in advance of these old-timers, no matter how faithful. Two new clutch-type machines have been recently added to the line, bringing the total up to 13 sizes and types. All of the machines have been re-engineered and are now in line with the best modern practise.

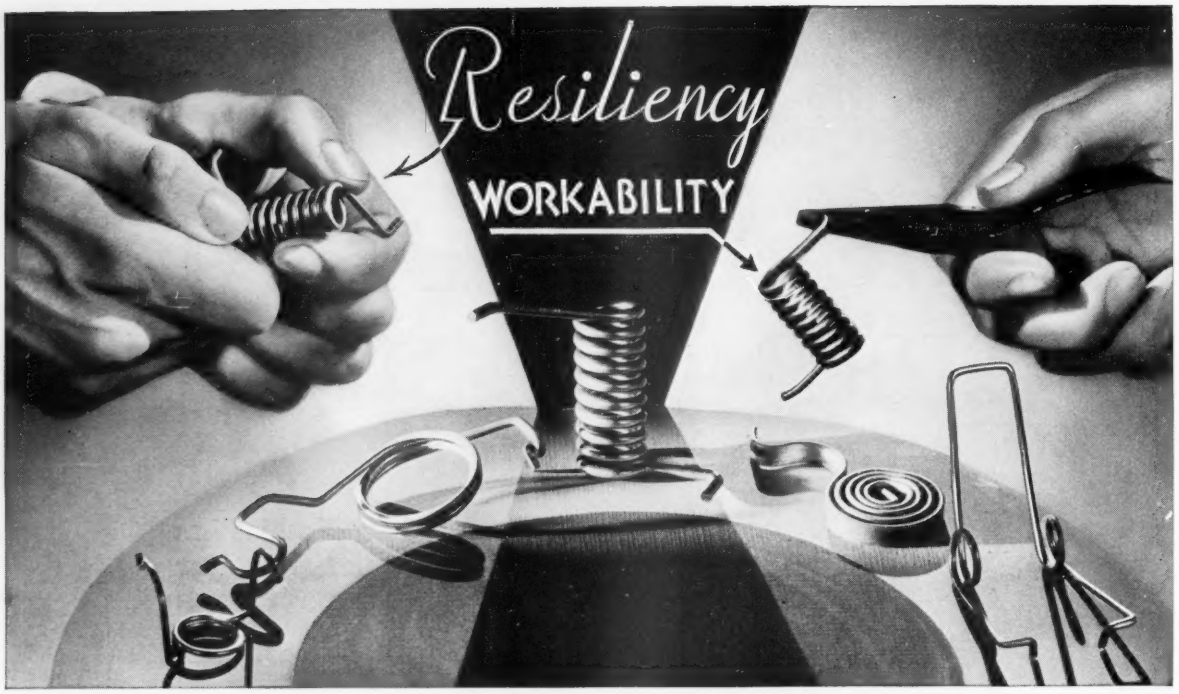
✦ ✦ ✦

IT will pay anyone interested in the production coiling of springs to look over our line before saddling his plant with some inferior machine which has neither capacity nor the versatility of the Universals.

## SLEEPER & HARTLEY, INC.

WORCESTER, MASS., U. S. A.

DESIGNERS & BUILDERS OF THE MACHINES THAT PUT THE 'RINGS' IN SPRINGS.




# SMOOTH WORKING STOCK
## TAKES THE "STING" OUT OF A CLOSE BID!

When conditions call for Phosphor Bronze, you should save time and money in the production of springs and formed wire jobs by using SEYMOUR Phosphor Bronze, because it will go through the most exacting processes smoothly, cleanly and without bothersome hold-ups.

The reason is this: Seymour Phosphor Bronze spring stock is hard enough to have good resiliency, yet sufficiently workable to permit sharp bends without weakening or breaking. Illustrated above are a few examples of the daily demands made upon and met by this very much out-of-the-ordinary spring stock. Note the number of bends, as many as eight in some cases!

It is all a matter of accurate *metallurgical balance*, and this is brought about through a vigilant and experienced selection of the virgin metals used and alert inspection all along the line of manufacture.

Numbered samples of all furnace heats are taken for chemical analysis, and no mix leaves the casting shop until it has the laboratory's full approval for possible ductility, tensile strength and grain structure. The result is a uniformity that holds business once we get it!

If your results with Phosphor Bronze wire have not been good, we would like to send you samples of Seymour Phosphor Bronze stock for test purposes, and no obligation will be included in the package!

FOR SERVICE

THE SEYMOUR MANUFACTURING CO., 62 FRANKLIN ST., SEYMOUR, CONN.

SEYMOUR
SHEETS, WIRE, RODS

## PHOSPHOR BRONZE

ALSO: NICKEL SILVER SHEETS, WIRE, RODS : AND NICKEL ANODES

# WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip Wire Products and Insulated Wire and Cable.

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 9 December 1934 No. 12

Designated as

Official Publication By The Wire Association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Kelly Wire Die Corporation

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TANTALUM

TUNGSTEN

&

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DIES

✦

**Kelly Wire Die Corporation**

Vascoloy Ramet Agents

256 W. 31st St., NEW YORK



By Arrangement With The Manufacturers' Committee of Reels And Spools Standardization

✦ ✦ ✦

**Reprints of the report of this committee as published in the November, 1934, issue of WIRE & WIRE PRODUCTS, outlining the proposed new standards for reels and spools for insulated wire and cable can be obtained for 25c a copy from**

✦ ✦ ✦

Wire & Wire Products
17 East 42nd St.
New York, N. Y.



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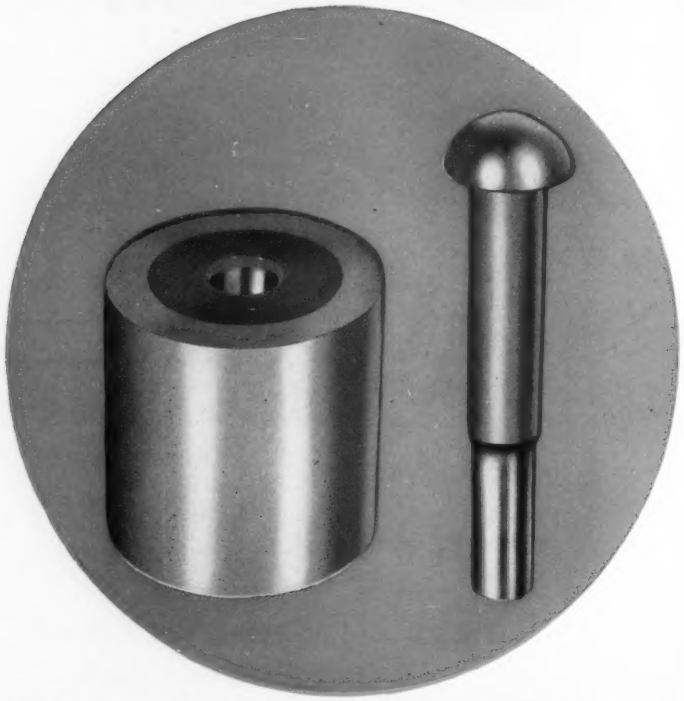
# *FOR THE LONG RUN*

FIRTH-STERLING
FIRTHALOY
QUALITY

## EXTRUSION DIES



Reports from the production records of large concerns located in or near the cities listed below are typical of many enthusiastic reports we are receiving from all over the United States on Firthaloy Bolt Extrusion Dies. These dies are still in use and on size:

| | |
|---|---|
| **DETROIT** | **"1,126,298 bolts extruded through a .444" Firthaloy Die."** |
| **CLEVELAND** | **"1,471,933 bolts extruded through a .330" Firthaloy Die."** |
| **PHILADELPHIA** | **"1,868,124 bolts extruded through a .345" Firthaloy Die."** |
| **CHICAGO** | **"1,899,678 bolts extruded through a Firthaloy Die." (size not given)** |

"These dies are still good for the production of many additional thousands."

Investigate the merits of Firthaloy Dies for your Extrusion Operations. They increase production, improve finish and at the same time reduce costs. Our Firthaloy Engineering Department is ready to cooperate with you.

# FIRTH-STERLING STEEL COMPANY

GENERAL OFFICE AND WORKS
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BRANCH OFFICES AND WAREHOUSES
NEW YORK CHICAGO
HARTFORD CLEVELAND
DETROIT PHILADELPHIA
LOS ANGELES

# WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING--- EXTRUDING --- FORMING --- FABRICATING

Vol. 9 December 1934 No. 12


# Bessemer and Open Hearth Steel Wire


*Frank H. Nullmeyer, Superintendent, Rod, Wire and Conduit,
Youngstown Sheet and Tube Company, Youngstown, Ohio.


The Manufacture of Basic and Open Hearth Steel Wire. A Lecture Before the Wire Association, October 3, 1934. ▲▲

BESSEMER and Basic Open hearth steel is made and rolled into billets at the main Campbell Plant and transported from there over our own railroad to the Rod & Wire Department located at Struthers, Ohio about one mile southeast of the Billet Mill.

✦ ✦ ✦

THE billets used in the double strand mill are 30 feet 6 inches long by 1⅞ inches square, weighing about 355 pounds each.

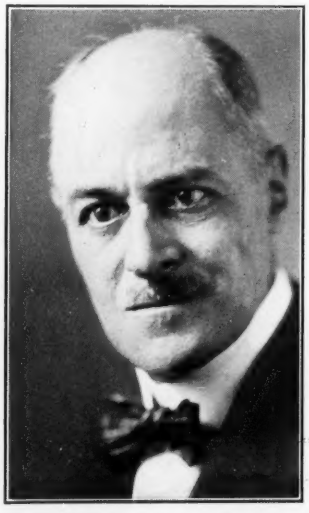
✦ ✦ ✦

THE billets come in various steel specifications from low carbon .06 and under, with manganese .15 and under, to carbon 1.10 and manganese up to 1.85 including other elements such as the variables in sulphur, phosphorus, silicon, copper and alloying metals which is included in approximately 65 different specifications.

✦ ✦ ✦

## Billet Storage and Handling

THE billet storage yard has a capacity of 10,000 gross tons of billets and the crane used for unloading the cars is of 10 tons capacity. The crane either places the billets in stock or takes them from stock to the rod mill furnace skids or direct from cars to the skids, from which they are fed one at a time by labor onto a roller conveyor which feeds them endwise as required into the furnace, the hearth of which has a gradual drop from this point to the burner end or discharging end of the furnace.



FRANK H. NULLMEYER

## The Billet Furnace

ON this slope from the charging end to the discharging end, enough billets are placed side by side for approximately one hour's rolling in the rod mill, the billets being heated with either gas or oil at the discharge end of the furnace with the flame passing over the billets to the charging end from which the products of combustion pass through suitable ports to the stack.

✦ ✦ ✦

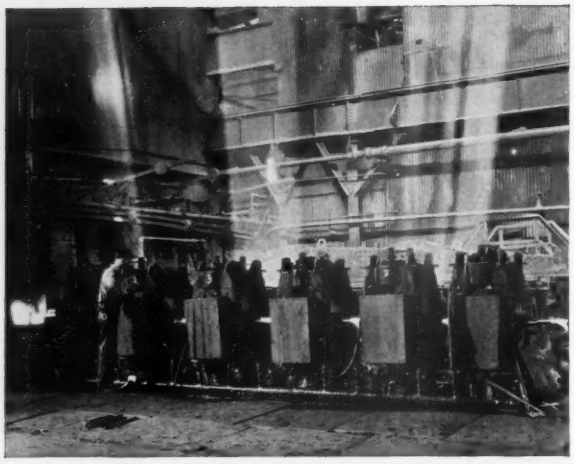
THE hearth of the furnace is filled with billets laid side by side from the charging end to the discharge end of the furnace. As billets are pushed out of the furnace the remainder must be pushed down the slope and additional billets charged to replace the number that were discharged.

✦ ✦ ✦

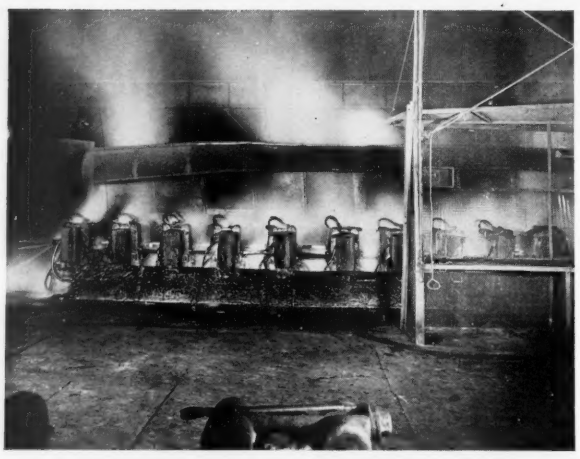
TO push the billets, a pusher consisting of a steam cylinder containing a piston, the piston being attached to suitable linkage to operate a shaft reaching from one side to the other outside of the rear of the furnace, is used. This shaft has arms attached to it at several points which connect with the pushers that reciprocate

*Deceased Oct. 20, 1934.


**Designated as Official Publication by the Wire Association**



This mill consists of a gas fired continuous furnace, 6 stands of roughing rolls and 10 stands of finishing rolls. It is known as the double strand continuous type and rolls two rods simultaneously from No. 5 (.206 in.) to 13/32 in. rods inclusive.



Ten stands of rolls on the rod mill. These are the finishing stands.

back and forth with the stroke made by the piston that push the billets down the slope. The operation of the pusher is controlled by the man who charges the billets into the charging end of the furnace.

## Rod Mill Roughing Stands

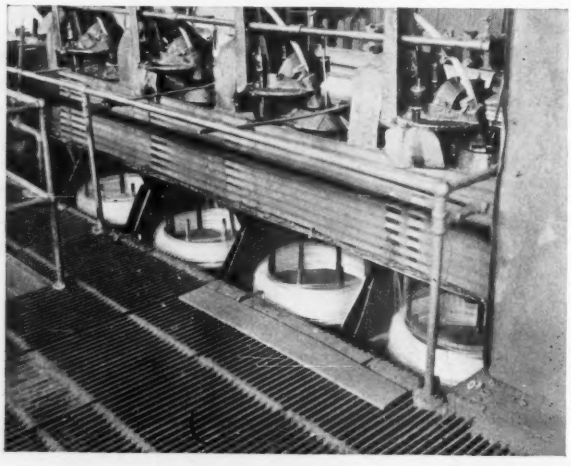
THE discharging of the billets from the furnace into the roughing stands of the rod mill is done by either the heater helper or the heater by means of a square push-out bar that is gripped between pinch rollers just outside the furnace. This bar is about half the length of the billets and the operator guides the end entering the furnace against the end of the first billet at the base of the slope and being pinched between the pinch rollers the bar pushes the billet out of the opposite side of the furnace starting the end into the first pass of the roughing mill.

THE roughing mill consists of six continuous stands of rolls, the first revolving at 18⅛ RPM and the 6th at 163¾RPM. Between the 6th and 7th pass or the first pass of the continuous finishing mill is a flying shear for cropping the front end of the squares from the 6th pass.

## Rod Mill Finishing Stands

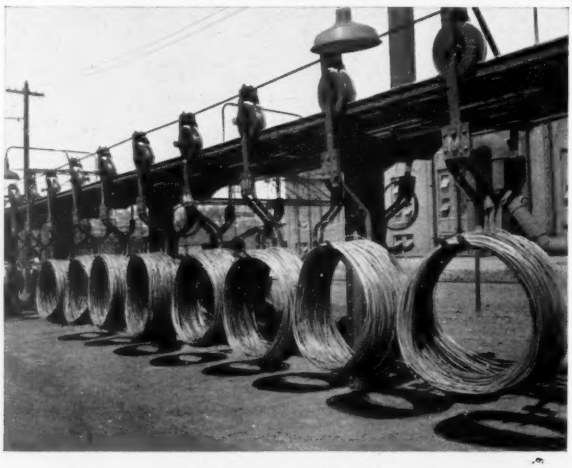
THE finishing mill consists of 10 passes, the 7th or finishing pass rolls revolving at 231¾ RPM and the 16th or last pass rolls revolving at 1150 RPM with a finishing speed of 4100 feet per minute.

THE passes alternate from ovals to squares through the roughing and finishing mill with the last pass, of course, finishing round from an oval. The smallest size rolled being No. 5 or .207 in the 16th pass. As larger sizes are required it is necessary to eliminate rolls in the finishing mill from the 16th stand back towards the roughing mill, and the sizes so finished are as follows: 16 stands 15/64 to No. 5 inclusive; 14 stands 17/64 to No. 3 inclusive; 12 stands 21/64 to 9/32 inclusive; 10 stands ⅜ to 11/32 inclusive.



THE LAYING REELS

The finished rods are reeled into bundles weighing about 340 lbs. each. Two bundles are coiled at the same time. The delivery speed on No. 5 rods is about one mile per minute. Bundles are removed from the coilers onto flat conveyor, then to cooling conveyor.



THE COOLING CONVEYOR

The rods are cooled on this conveyor and inspected for dimension, possible defects or seams. The crop ends are trimmed off and each bundle is tagged for specification. Rods are now prepared for shipment or transfer to the drawing department.

### Laying Reels

THE rods leaving the finishing stands are wound on what are known as "laying reels" of which there are four in this mill; two for each strand of rod. The strand on leaving the finishing pass of rolls is laid in coil or bundle form instead of being wound with the bundle revolving.

✦ ✦ ✦

WHEN the last end leaves the rolls the pipe through which the rod had traveled from the rolls to the reel on which it had been wound, is shifted side-ways and another pipe is moved in place which leads to another reel. This is repeated for every bundle which accounts for the four reels used for the two strands.

✦ ✦ ✦

### Rod Cooling

THE bundles of rods are transferred from the reels to a cooling conveyor where they are gauged and inspected, trimmed and tied with band wires. This cooling conveyor has about 850′ travel from the mill out to the yard and back which is ample to allow the bundles to cool and be handled by hand if necessary.

✦ ✦ ✦

### Rod Handling Equipment

THE bundles are removed from the cooling conveyor and placed standing vertically on skids one bundle against another which permits the introduction of a hair-pin hook through the space inside the bundles. These hair-pin hooks are suspended from over-head carriers and a cab in which an operator sits which travels over a monorail system consisting of nearly a mile of track divided up into short sections of about 100′ long inside of a storage building in which the various sizes and steel specifications of rods can be stocked for future use or shipment, or direct from the rod mill into cars for shipment, or to the wire mill cleaning house. The rods produced in the rod mill are weighed when suspended on the hair-pin hook in the rod mill and a duplicate scale at the entrance to the cleaning house weighs the rods taken from stock, which are deposited on a truck inside the cleaning house to be picked up by a mono-rail electric crane which travels over the pickling, rinsing, and lime tubs or sulling rack and in front of the baker to be loaded on trucks going into the baker.

✦ ✦ ✦

### Pickling

THE pickling tubs are made of hard burned brick laid up with sulphur and silica sand built inside a concrete rectangular tank. The rinsing tubs and lime tubs are steel.

THE straight line method of the arrangement was adopted in 1925 being probably the first installation of its kind to be used in the wire industry, having been changed from the then conventional circular arrangement using jib cranes and wood pickling tubs.

✦ ✦ ✦

### Dies

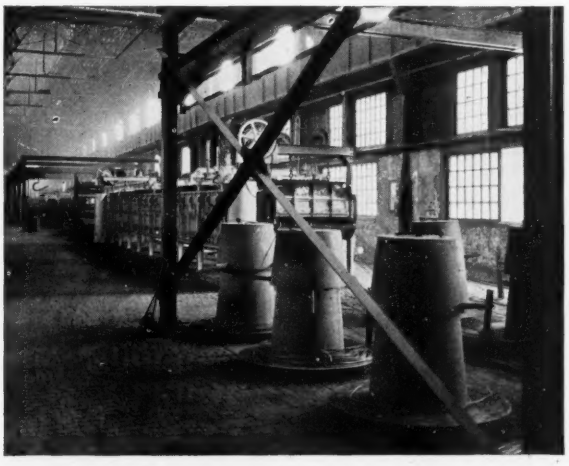
IN 1929 we began the use of tungsten carbide dies for sizing the wire instead of cast iron or steel dies and immediately equipped the mill with die sizing and polishing equipment with which, by the use of the tungsten carbide dies, we were able to improve the finish of the wire drawn and also reduce the amount of rejected wire such as scratched and run-out wire.

✦ ✦ ✦

### Patenting

THE patenting furnace and equipment used for patenting high carbon wire such as spring and rope wire, consists of 36 double deck reels, a furnace 50′ long and 4′ wide, two lead pans for lead quenching the rods or wire, a scale breaker, 36 take-up blocks divided into three sections of 12 blocks each and driven with variable speed motors by which block speeds of from 6/10 RPM to 10.2 RPM can be obtained. Each motor is equip-

**Rods used in the drawing of various kinds of wire for special requirements, or finishes, are prepared in the wire mill cleaning house. In this section are the pickling tanks, rinse tubs, lime vats and sulling rack where rods are prepared for drawing.** ✦ ✦ ✦



**This installation for patenting wire is unique as to burner arrangeing high carbon spring and rope wire. The furnace is pyrometrically ment and represents the latest development in equipment for heat treatcontrolled, assuring a high quality product.** ✦ ✦ ✦

ped with an electric tachometer so that the speed of all three can be set at uniform speed or if three different sizes of stock are to be patented, each one can be run at the speed required for the size being run. The blocks are interchangeable, the frames being arranged to take block diameters from 24″ up to 60″.

✦ ✦ ✦

The furnace is equipped with 42 burners, 21 on each side with the burners on one side being located mid-way between the burners on the opposite side in the furnace.

✦ ✦ ✦

THE advantage to be had with the 42 burners is that a very uniform distribution of heat can be had, also that any shorter length of furnace may be had by shutting off the burners from the entrance toward the discharge end.

✦ ✦ ✦

### Welding The Rod

THE loading of reels at the charging end of the furnace, as well as the unloading of the take-up blocks, is done with stiff arm control over-head electric hoists. The reel loading hoists are equipped with three prong grab hooks by which the bundles are picked up flat and placed on the upper part of the double deck reels. We weld the bundles together; instead of making the usual hook and eye splice, we leave sufficient flash at the weld so it can be found at the take-up blocks and cut at the weld. The unloading hoists are equipped with hair-pin hooks onto which the bundles are stripped from the take-up blocks and then loaded on trucks ready for the cleaning house.

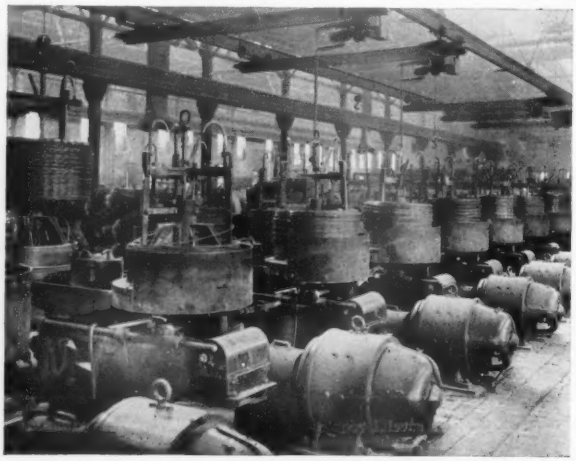
✦ ✦ ✦

### Batch Type Furnaces

WITH the gradually increasing demand for the higher carbon and alloyed steels used for bolts and cold headed articles made from wire, we found it necessary to install furnaces in which we could normalize, 1750°, or spehodize 1350° in hours, or in 8 hours anneal 1350° the rods or wire used for such purposes. These furnaces were installed and put in operation April, of this year (1934).

✦ ✦ ✦

THESE are what are known as the batch type furnaces where the rods or wire in coil form is loaded on a stem which will hold from 2 to 3 tons, and charged into an alloyed steel pot inside the furnace, 4′3″ dia. x 8′ long, 25% chrome, 12% nickle. The burners, 1750° F. to 1800° F., of which there are three to each furnace, one near the bottom, the second 120° around and up to the center while the third 240° around from the first and near the top of the furnace or pot in the furnace. All set tangently to the inside diameter of the furnace, the flame swirling in a space between the outside brick wall and another 4½″ wall between the outside wall and the pot. This inner wall is built up with numerous openings in it by leaving out a half brick at irregular locations, thereby acting as a baffle and checker work. Between the inner diameter of this wall and the pot there is another space of about 4 inches in which the heat and flame through the openings in the 4½″ wall is uniformly diffused and distributed to the pot and material in it, the products of combustion escaping to the stack through a flue under the center of the bottom of the pot from the space between the pot and the 4½″ baffle wall around it.



NULLMEYER WIRE DRAWING BLOCKS
The prepared rods are drawn on these individually motor driven blocks, which are the latest development in the wire drawing industry. The wire is here shuttled back and forth, thru a special die, from one block to another, until desired size is obtained. ✦ ✦ ✦

✦ ✦ ✦

### Gas For Fuel

WE use a mixed gas consisting of blast furnace and by-product coke oven gas with a heating value of about 350BTU's. Both the gas and air pressures are regulated and controlled by proportioning valves, one for each furnace controlling the three burners. The motors used to open or close these valves are operated from the recording and indicating pyrometer for the furnace which, when set for a certain temperature and that temperature obtained, permits no noticeable variation so long as it is desired to hold the stock in the pot at that temperature. At the end of the cycle the stem of material is lifted out of the pot with an overhead electric traveling crane and placed in a pit or if desired, to cool rapidly it is then set on the floor and another previously loaded stem is put into the pot. The controls, in the meantime, automatically take care of the variation in gas required due to the removal of a hot stem and the introduction of a cold one.

✦ ✦ ✦

### Wire Drawing Equipment

IN 1929 we also scrapped the wire drawing equipment we had been using, which consisted of the old style fixed speed drawing blocks mounted on benches in groups of from 6 to 12 blocks per bench and in sizes from 16″ to 26″ diameter blocks. Each bench or group of blocks was driven with an A.C. electric motor through a gear arrangement that gives the fixed block speed required for coarse or fine wire to the bench on which such sizes were drawn, which resulted in that at times owing to the

orders received, some of the blocks would be idle and others were being crowded to get out all the wire that could be produced on them. We originally had 202 such blocks in the mill with a capacity of 10,000 tons per month, which were replaced with 29 Nullmeyer turntable type of machines and the space formerly occupied in the buildings by the old equipment is now used for other purposes.

✦ ✦ ✦

### Operation of the Nulmeyer Machines

THE Nullmeyer machines being driven with variable speed motors and having inter-changeable block sizes permits the taking the table and changing the dies to a smaller size and continuing the drawing until the desired finished size is obtained. A new bundle is then started, after which the previous drawn bundle can be removed, thereby reducing lost time to a minimum and increasing the efficiency of the equipment. This has more than doubled the output per man that was formerly obtained with the old equipment, and at the same time the men produce this increased tonnage with less fatigue than formerly.

✦ ✦ ✦

### Testing and Inspecting

FOR testing and inspecting rods and wire, in addition to the main chemical and physical laboratory at the Campbell Plant, we make a great many tests in a testing room at the wire mill. Some stocks are tested at both ends of the bundle in a tensile machine and/or a torsion machine. In addition to the corps of men used in the laboratories and testing room, there are several inspectors gauging and inspecting the product while in process to make sure the material will be as close to what is specified and required as it is humanly possible to produce it.

✦ ✦ ✦

### Galvanized Wire

THE galvanized wire department consists of three take-up frames of 30 blocks each and the necessary lead annealing furnaces, acid tanks and spelter pans and furnaces. Each frame is driven by a variable speed motor.

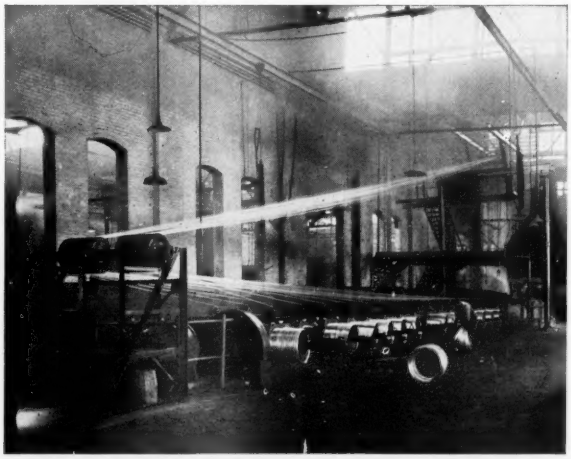
✦ ✦ ✦

### Lead Annealing Furnaces

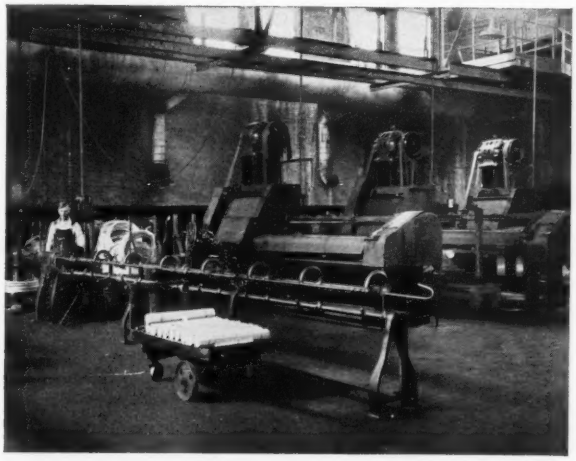
THE lead annealing furnaces are equipped with automatic temperature control. Mixed blast furnace and by-product coke oven gas is used for fuel under the lead and spelter pans, each one of which has a thermo couple and recording and direct reading pyrometer.

✦ ✦ ✦

ONE outfit is equipped to make either asbestos pressure wiped wire or charcoal wiped wire for heavily galvanized wire.



**This galvanizing unit manufactures either double galvanized or close wiped wire. For double galvanized wire the strands leave the pot in a vertical position. For close wiped wire they leave the pot on a horizontal plane on their way to the reeling blocks.** ✦ ✦



**Wire straightening and cutting machines. Straightened and cut wire for welding and many special manufacturing purposes is prepared and bundled in uniform packages for shipment in this department.** ✦

of orders for either coarse or fine wire from ¾″ down to No. 20 gauge, either high or low carbon stock, as the speed range and block size can be had to meet the necessary requirements. With the slow creeping start and gradual acceleration to speeds as high as 225 RPM, the breaking of points and the time lost in re-pointing them, which was a common occurrence with the old equipment due to the sudden starting of the blocks to their full running speed, has been entirely eliminated with the new equipment. The elimination of the necessity of stripping the block after each draft on multi-draft wire and transferring to another reel, or machine, for further drawing is also eliminated by simply turning

### Straightening And Cutting

THE straightening and cutting department consists of 10 machines capable of cutting wire or rods in sizes ranging from #16 gauge to ½″ inclusive, and in lengths up to 60′ in the coarser sizes, from ¼″ diameter and larger up to 4′ from 16 gauge annealed wire, to 8′ from 16 gauge hard wire.

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SUCH material is used for various purposes by the manufacturing trade for toys, velocipedes, wagons, baby carriages, coasters, skooters, curtain rods, stair rods, welding wire, tie wire and many other articles requiring straight uniform lengths.

### Nail Manufacture

SOME of the wire we produce is made into nails, having 193 nail machines capable of producing 4,000 kegs or 200 tons of nails per day ranging in size from $\frac{3}{16}$" long by #20 gauge running 22,000 to the pound, to 12" long by $\frac{3}{8}$" gauge running 2½ nails to the pound. We list over 5,000 different sizes, styles and finishes which include large head, oval head, countersunk head, bung head, flat head, double head, headless, checkered head, hollow head, cone head, cup head, diamond point, chisel point, side point, needle point, duck bill point, blunt point and pointless barbed or smooth shanks, polished, annealed, blued, cement coated, electro or hot galvanized or coppered and frequently various combinations of several of the above styles or finishes on special nails.

✦ ✦ ✦

### Nail Machines

THE largest nails are produced at a speed of 135 nails per minute per machine with a gradual increase in speed as the sizes decrease, to 600 nails per minute on the smallest machines. This means that the 193 machines produce 2,941,000 nails per hour or nearly 50,000 per minute in many different sizes. Here, as in all other departments, special inspectors are continually gauging or measuring and observing the making, packing and weighing of the nails. It is almost unbelievable that with the quantity produced there are so few that might have even a slight imperfection escape the inspectors.

✦ ✦ ✦

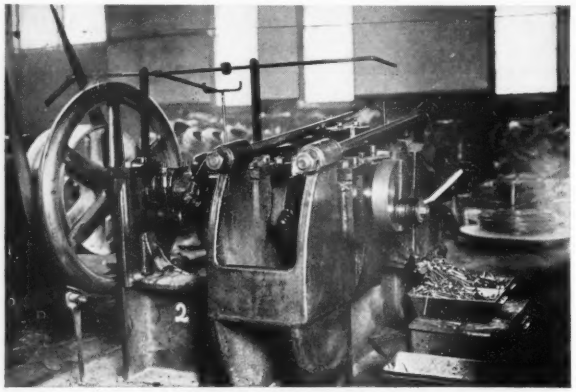
### Wire Hoops

WE have 13 wire hoop machines of our own design, 10 of which are used to make what are known as twisted splice hoops, and three machines making spiral wire hoops. The combined capacity of the 13 machines is 425,000 hoops per day ranging in size from 11" diameter to 25½" diameter, using either Nos. 8, 9, 10 or 11 gauge wire.

✦ ✦ ✦

### Operation of Hoop Machine

THE wire is fed from a bundle on a reel by means of feed rollers through a circular guide on the machine which when the wire has traveled around this guide. cuts it to a length somewhat longer than the circumference of the finished hoop, thus leaving the ends overlapping. The ends are then gripped and a slotted gear wheel mid-way between the gripped ends revolves with the two sections of the wire in the slot which forms the twist. The circular guide then opens and the hoop is kicked out onto the expander which stretches the hoop slightly and gives it a more uniform diameter as well as a true circular shape.



NAIL MACHINES

Nails from 3/16 in by 20 gauge with 22,000 nails to the pound to 12 in. by ¾" gauge with 2½ nails to the pound are manufactured on machines of this type.

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✦ ✦ ✦

THESE hoops are used for slack barrel cooperage such as nail kegs and barrels to hogs heads, for packing and shipping such articles and materials as hardware, glassware, flour, salt, lime, asphaltum, tar, various dry chemicals, fruit and vegetables.

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### Barbed Wire Production

THE barbed wire machines are our own design and built as a universal machine so that various popular patterns of barbed wire could be produced on one machine instead of a separate machine for each different style or pattern such as a flat 2 point barb or a round or half-round 2 point barb around one strand wire or a four point barb around either one or two strands. Any of the barbs can be spaced on the strands at any distance desired from 3" to 6" apart at a speed of 350 barbs per minute. We have 29 of these machines and each machine will produce on an average 3¾ tons of finished barbed wire per day.

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### Wire Inspection Before Shipment

IN the bundling of wire for shipment it receives another inspection for finish and gauge before the tie wires are placed or secured, this inspection is usually done while the wire is being removed from the truck on which it was transported from the department that produced it, such as galvanized wire, coppered liquor finished, extra bright wire, sull coated or our nogald and extrudo finishes. Some of these, like the extra bright being used to manufacture articles that are tinned or plated, are sometimes oiled to prevent rusting while in transit or in the manufacturer's stock. This we do if requested. We oil the wire by dipping the tied-up bundles into a tank of oil and allowing the surplus oil to drain off by placing the bundles on sloping racks and draining the oil back into the tank. Some wires, especially coppered and liquor finished, are ordered paper and burlap wrapped which we do with wrapping machines after the wire has been bundled. There never has been a successful machine produced, so far as we know, that will bundle or tie up bundles of coiled wire as well as can be done by hand.

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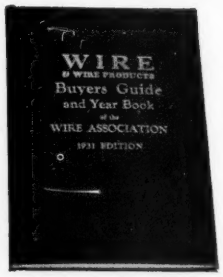
### Special Requirements in Bundle Weights

SOME of our customers desire bundle weights that could not be obtained with the size billets we

(*Please turn to page 458*)

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**Official Publication of The Wire Association**

# The Wire Industry

## As Shown By The Census of Manufactures for 1933

**Statistics For 1933 As Compared With 1931 Show Increases In Iron And Steel And Brass And Bronze Wire Production But Radical Decreases In Copper (41.8%) And Other Non-Ferrous Wire (44.2%) Production.**

WAGE-EARNER employment in the manufacture of wire and fabricated-wire products in the United States increased rapidly during the spring and summer of 1933 but decreased somewhat in the fall, according to a preliminary report compiled from data collected in the Biennial Census of Manufactures taken in 1934, released October 31 by Director William L. Austin, Bureau of the Census, Department of Commerce.

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THE figures for the final months of the several quarters of the year are as follows: "Wire Drawn from Purchased Rods" industry—March, 11,228; June, 13,249; September, 18,627; December, 17,817. "Wirework Not Elsewhere Classified" industry—March, 13,387; June, 18,882; September, 22,307; December, 19,364. The average for the year for each industry is slightly higher for 1933 than for 1931.

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THE production of wire in 1933, including that made and consumed in the same plants, was as follows: Plain iron and steel wire, 1,962,076 tons (of 2,000 pounds), an increase of 5.2 per cent over 1,865,758 tons in 1931; copper wire, 265,524,275 pounds, a decrease of 41.8 per cent from 455,881,987 pounds in 1931; brass and bronze wire, 62,506,499 pounds, an increase of 17.7 per cent over 53,097,552 pounds in 1931; other nonferrous wire, 14,948,779 pounds, a decrease of 44.2 per cent from 26,780,761 pounds in 1931.

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THE 1933 production of wire for sale and interplant transfer was: Iron and steel wire, 883,922 tons, valued at $60,589,024; copper wire, 99,135,393 pounds, $10,304,898; brass and bronze wire, 55,014,711 pounds, $7,527,261; other nonferrous wire, valued at $6,760,107.

✦ ✦ ✦

THE principal fabricated-wire products made in 1933 were as follows: Nails, brads, and spikes, 9,100,045 kegs (of 100 pounds), valued at $24,303,006 wire rope and cable (except insulated), 49,020 tons, $13,614,901; woven-wire fence (except poultry netting), 203,357 tons, $13,907,455; wire springs, valued at $23,714,778; barbed wire, 182,441 tons, $8,608,271; insulated wire and cable, valued at $61,304,491.

✦ ✦ ✦

TABLE 4 of this report covers the total production of wire and of the chief classes of wire products reported by establishments in all industries in which wire and wire products are made. The figures do not, however, cover needles and pins, bolts, and many minor items of hardware, all made from wire.

✦ ✦ ✦

THE "Wire Drawn from Purchased Rods" industry, as defined for census purposes, consists in the drawing of wire from purchased rods of iron, steel, copper, or other metals, and does not, therefore, include production by the wire-drawing departments of iron, steel, copper, and other rolling mills. The drawing of wire in 1933 was reported by 156 establishments, of which 78 drew wire from purchased bars or rods. Of the remainder, 41 were operated as departments of iron and steel rolling mills and 37 as departments of nonferrous-metal rolling mills and other establishments. No attempt is made to prepare statistics for wage earners, wages, and cost of materials for the wire-drawing departments of rolling mills and other establishments. The data for these items are not, therefore, included in this report.

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THE "Wirework Not Elsewhere Classified" industry embraces establishments engaged in the manufacture, from purchased wire, of commodities such as woven-wire fencing, fly screening and other wire cloth and netting, wire rope and cable, tire chains, concrete-reinforcing wire, and such articles as wire trays and baskets, springs, etc. It does not cover plants engaged in insulating purchased plain wire.

✦ ✦ ✦

STATISTICS for insulated wire, covering the total production in all industries in which it is made, either as a major or as a minor product, are given in Table 4.

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THE number of establishments engaged primarily in the manufacture of wire products from purchased wire was 442. In addition, fabricated wire products are made to a considerable extent by fabricating departments of establishments engaged primarily in drawing wire, and to a less extent as secondary products by establishments classified in other industries.

✦ ✦ ✦

STATISTICS for 1933 with comparative figures for earlier years, are given in the following tables. All figures for 1933 are preliminary and subject to revision.

## TABLE 1

### Summary for the Industries 1933, 1931, and 1929

| | 1933 | 1931* | 1929 |
|---|---|---|---|
| **"Wire Drawn from Purchased Rods" Industry** | | | |
| Number of establishments | 78 | 82 | 81 |
| Wage earners (average for the year) 1/ | 14,656 | 14,476 | 22,467 |
| Wages 2/ | $14,321,076 | $17,179,057 | $35,110,335 |
| Cost of materials, fuel, and purchased electric energy 2/ | $39,616,126 | $45,187,263 | $126,182,429 |
| Products, total value 2/ | $75,475,581 | $83,370,125 | $213,997,410 |
| Plain wire, for sale and interplant transfer | $31,666,005 | $33,377,187 | $95,126,565 |
| Fabricated-wire products | $37,193,081 | $43,391,654 | $97,313,199 |
| Other products (not normally belonging to the industry) | $6,616,495 | $6,601,284 | $21,557,646 |
| Value added by manufacture 3/ | $35,859,455 | $38,182,862 | $87,814,981 |
| **"Wirework Not Elsewhere Classified" Industry** | | | |
| Number of establishments | 428 | 500 | 547 |
| Wages earners (average for the year) 1/ | 17,551 | 17,381 | 22,388 |
| Wages 2/ | $14,111,433 | $17,579,320 | $27,912,231 |
| Cost of materials, fuel, and purchased electric energy 2/ | $35,029,915 | $40,609,982 | $68,144,047 |
| Products, total value 2/ | $74,489,808 | $87,350,335 | $146,805,049 |
| Fabricated-wire products | $69,292,139 | $80,491,227 | $135,865,597 |
| Other products (not normally belonging to the industry) | $5,197,669 | $6,859,108 | $10,939,452 |
| Value added by manufacture 3/ | $39,459,893 | $46,740,353 | $78,661,002 |

* **Figures for wirework industry revised to include data for wire paper clips, formerly classified in the "Stationery Goods" industry.**

**1/ Not including salaried officers and employees. Data for such officers and employees will be included in a later report. The item for wage earners is an average of the numbers reported for the several months of the year. In calculating it, equal weight must be given to full-time and part-time wage earners (not reported separately by the manufacturers), and for this reason it exceeds the number that would have been required to perform the work done in the industry if all wage earners had been continuously employed throughout the year. The quotient obtained by dividing the amount of wages by the average number of wage earners can not, therefore, be accepted as representing the average wage received by full-time wage earners. In making comparisons between the figures for 1933 and those for earlier years, the possibility that the proportion of part-time employment varied from year to year should be taken into account.**

**2/ Profits or losses can not be calculated from the census figures because no data are collected for certain expense items, such as interest, rent, depreciation, taxes, insurance, and advertising.**

**3/ Value of products less cost of materials, fuel, and purchased electric energy.**

## TABLE 2

### Wage Earners, by Quarters: 1933 and 1931

(The figure for the final month of each quarter is the tatol number of wage earners on the pay rolls for the week including the fifteenth day of the month, or for some other representative week in the month).

| Census year | March | June | September | December |
|---|---|---|---|---|
| "Wire Drawn From Purchased Rods" Industry | | | | |
| 1933 | 11,228 | 13,249 | 18,627 | 17,817 |
| 1931 | 15,519 | 14,399 | 13,880 | 13,320 |
| "Wirework Not Elsewhere Classified" Industry. | | | | |
| 1933 | 13,387 | 18,882 | 22,307 | 19,364 |
| 1931 | 19,116 | 17,292 | 16,501 | 16,312 |

## TABLE 3

### Wire and Wire Products—Production, by Industry and by Value: 1933 and 1931

| | 1933 | 1931 |
|---|---|---|
| Wire made for sale and interplant transfer, total value | $85,181,290 | $99,982,926 |
| Made in "Wire Drawn from Purchased Rods" industry | 31,666,005 | 33,377,187 |
| Made by wire-drawing departments of steel works and rolling mills | 36,346,639 | 36,096,566 |
| Made by wire-drawing departments of nonferrous rolling mills and other establishments | 17,168,646 | 30,509,173 |
| Fabricated-wire products, total value | 212,426,356 | 302,848,189 |
| Made in "Wirework Not Elsewhere Classified" industry | 69,292,139 | 80,491,227 |
| Made in "Wire Drawn from Purchased Rods" industry | 37,193,081 | 43,391,654 |
| Made by wire-drawing departments of steel works | 55,141,076 | 63,222,372 |
| Made by wire-drawing deparements of nonferrous rolling mills | 15,276,977 | 48,710,394 |
| Made as secondary products in other industries | 35,523,083 | 67,032,542 |

TABLE 4

Wire and Wire Products—Production, by Kind, Quantity, and Value: 1933 and 1931
(Ton, 2,000 pounds)

| Class and kind | 1933 | | 1931 | |
|---|---|---|---|---|
| | Quantity | Value | Quantity | Value |
| **Iron and Steel Wire** | | | | |
| **Bare Wire** | | | | |
| **Plain**, total tons | 1,962,076 | ..... | 1,865,758 | ..... |
| Made for sale, tons | 611,169 | $39,856,395 | 531,129 | $35,661,372 |
| Transferred to other plants of same company, tons and assigned value | 55,819 | 3,729,716 | 72,156 | 4,830,850 |
| Produced and consumed in same works, including that subsequently galvanized or otherwise coated, and cold-rolled, tons (no value assigned) | 1,295,046 | ..... | 1,262,377 | ..... |
| Drawn on contract or custom basis from rods owned by others, tons | 42 | ..... | 96 | ..... |
| **Galvanized—** | | | | |
| Made for sale and interplant transfer, tons | 167,925 | 9,936,208 | 171,722 | 10,963,179 |
| Produced and consumed in same works, tons (no value assigned) | 385,234 | ..... | 397,045 | ..... |
| For footnotes, see p. 6. | | | | |
| **Other coated wire—** | | | | |
| Made for sale and interplant transfer, tons | 33,575 | $4,184,477 | 43,398 | $5,163,961 |
| Produced and consumed in same works, tons (no value assigned) | 3,624 | ..... | 3,490 | ..... |
| **Cold-rolled from drawn wire—** | | | | |
| Made for sale and interplant transfer, tons | 15,434 | 2,882,228 | 13,726 | 2,361,291 |
| Produced and consumed in same works, tons (no value assigned) | 2,045 | ..... | 13,859 | ..... |
| **Copper and Other Non-Ferrous Wire** | | | | |
| **Copper wire**, total pounds | 265,524,275 | ..... | 455,881,987 | ..... |
| Made for sale and interplant transfer, pounds | 99,135,393 | 10,304,898 | 187,920,561 | 22,883,779 |
| Produced and consumed in same works, pounds (no value assigned) | 156,715,427 | ..... | 242,389,775 | ..... |
| Drawn on contract or custom basis from rods or bars owned by others, pounds | 9,673,455 | ..... | 25,571,651 | ..... |
| **Brass and bronze wire**, total pounds | 62,506,499 | ..... | 53,097,552 | ..... |
| Made for sale, pounds | 50,064,287 | 6,894,199 | 43,628,853 | 7,293,389 |
| Transferred to other plants of same company, pounds and assigned value | 4,950,424 | 633,062 | 4,402,352 | 611,107 |
| Produced and consumed in same works, pounds (no value assigned) | 4,997,006 | ..... | 5,066,347 | ..... |
| Drawn on contract or custom basis from rods owned by others, pounds | 2,494,782 | ..... | ..... | ..... |
| **Other nonferrous wire:** 1/ | | | | |
| Made for sale and interplant transfer— | | | | |
| Quantity reported, pounds | 14,902,270 | 6,447,111 | 26,750,195 | 10,213,998 |
| Quantity not reported | ..... | 312,996 | ..... | ..... |
| Produced and consumed in same works, pounds (no value assigned) | 46,509 | ..... | 30,566 | ..... |
| **Iron and Steel Wire Products** | | | | |
| **Wire Products—Total value** | ..... | $212,426,356 | ..... | $302,848,189 |
| Wire products except insulated wire and cable, total value | ..... | 151,121,865 | ..... | 182,650,887 |
| **Iron and steel wire products:** | | | | |
| Nails, brads, and spikes, kegs (100 pounds), total 2/ | 9,100,045 | 24,303,006 | 8,177,139 | 22,531,504 |
| Bright, not including galvanized and other coated, kegs | 7,326,024 | 18,145,443 | 6,469,423 | 16,547,768 |
| Galvanized, kegs | 678,400 | 2,894,922 | 583,957 | 2,674,003 |
| Cement-coated, kegs | 1,095,621 | 3,262,641 | 1,123,759 | 3,309,733 |
| Tacks, wire 3/— | | | | |
| Quantity reported, pounds | 3,182,368 | 263,352 | 2,620,399 | 218,325 |
| Quantity not reported | ..... | 111,133 | ..... | ..... |
| Staples, wire— | | | | |
| Quantity reported, pounds | 55,353,039 | 1,483,493 | 44,863,149 | 1,384,732 |
| Quantity not reported | ..... | 273,487 | ..... | ..... |
| Barbed wire, plain and coated, tons | 182,441 | 8,608,271 | 161,813 | 8,280,455 |
| Rope and cable, except insulated, tons | 49,020 | 13,614,901 | 57,280 | 18,411,707 |
| Strand, galvanized, tons | 20,080 | 2,098,249 | 35,580 | 3,283,509 |
| Poultry netting, tons | 29,304 | 3,724,796 | 31,988 | 4,164,838 |
| Woven-wire fence, except poultry netting, tons | 203,357 | 13,907,455 | 242,295 | 17,897,171 |
| Fly screening, pounds | 46,855,562 | 6,263,588 | 31,718,816 | 4,622,679 |
| Other wire cloth, pounds | 22,521,878 | 2,734,265 | 24,949,168 | 4,176,747 |
| Concrete-reinforcement wire— | | | | |
| Quantity reported, tons | 54,990 | 2,961,820 | 140,131 | 8,177,315 |
| Quantity not reported | ——— | 703,000 | ..... | ..... |

For footnotes, see end of summary.

**Wire and Wire Products—Production, by Kind, Quantity, and Value: 1933 and 1931—Iron and Steel Products (Continued)**

**Iron and Steel Wire Products**

**(Ton, 2,000 pounds)**

| Class and Kind | 1933 | | 1931 | |
|---|---|---|---|---|
| | Quantity | Value | Quantity | Value |
| Wire lath, tons | 8,356 | 377,769 | 10,132 | 798,239 |
| Other woven wire, tons | 19,712 | 4,458,829 | 17,702 | 4,723,466 |
| Bale ties, pounds | 124,090,271 | 3,679,805 | 109,349,434 | 3,592,828 |
| Wire springs, total value | ..... | 23,714,778 | ..... | 26,685,588 |
| Furniture and other upholstery (including mattress) springs | ..... | 13,778,292 | ..... | 15,093,268 |
| Valve springs for internal-combustion engines | ..... | 811,532 | ..... | 1,884,702 |
| Miscellaneous spiral springs | ..... | 4,392,561 | ..... | 5,528,510 |
| Flat springs, coiled | ..... | 1,672,278 | ..... | 1,300,714 |
| Other wire springs | ..... | 3,060,115 | ..... | 2,878,394 |
| Automoble skid chain— | | | | |
| Quantity reported, tons | 11,878 | 2,752,513 | 22,375 | 5,284,627 |
| Quantity not reported | ..... | 583,550 | ..... | 702,211 |
| Other chain, tons | 14,364 | 2,569,165 | ..... | 1,558,123 |
| Welding wire, pounds 4/ | 23,327,526 | 1,581,391 | 22,795,327 | 1,426,702 |
| Other fabricated iron and steel wire products 5/ | ..... | 16,744,218 | ..... | 23,802,859 |
| **Non-Ferrous Wire Products** | | | | |
| Fly screening— | | | | |
| Copper and bronze, pounds | 9,696,939 | $2,324,037 | 9,829,125 | $3,160,476 |
| Other metals, pounds | 91,344 | 63,837 | | |
| Fourdrinier and cylinder wire cloth, pounds | 1,985,427 | 3,188,779 | 1,899,155 | 3,081,552 |
| Other nonferrous-wire cloth— | | | | |
| Quantity reported, pounds | 2,488,321 | 1,073,305 | 1,624,893 | 1,234,652 |
| Quantity not reported | ..... | 153,820 | ..... | ..... |
| Copper strand, not insulated, pounds | 25,770,519 | 2,479,905 | 59,050,913 | 7,383,190 |
| Other fabricated nonferrous-wire products, except insulated wire | ..... | 2,101,234 | ..... | 5,670,408 |
| Fabricated-wire products not reported by kind | ..... | 2,224,114 | ..... | 396,984 |
| **Insulated Wire and Cable** | | | | |
| Insulated wire and cable, 6/ total value | ..... | 61,304,491 | ..... | 120,197,302 |
| Rubber-insulated: | | | | |
| Lighting and power circuit— | | | | |
| Braided | ..... | 12,787,678 | ..... | 22,675,481 |
| Leaded | ..... | 3,088,649 | ..... | 8,859,493 |
| Telephone | ..... | 3,262,066 | ..... | 6,648,539 |
| Flexible cords (rubber insulation, cotton and silk covered) | ..... | 6,728,295 | ..... | 7,717,411 |
| Cotton-insulated, weatherproof | ..... | 5,614,306 | ..... | 13,055,853 |
| Paper-insulated: | | | | |
| Lighting and power circuit | ..... | 3,237,921 | ..... | 37,020,651 |
| Telephone and telegraph cable (including submarine) | ..... | 2,793,609 | | |
| Varnished-cambric insulated | ..... | 1,978,831 | ..... | 3,389,296 |
| Magnet: | | | | |
| Cotton and silk covered | ..... | 5,155,879 | ..... | 4,877,549 |
| Enameled | ..... | 4,984,631 | ..... | 6,157,775 |
| Cotton-insulated slow-burning, and asbestos-insulated | ..... | 1,634,079 | ..... | 2,530,446 |
| Other insulated wire and that not distributed by kind of insulation | ..... | 10,038,547 | ..... | 7,264,808 |

**1/ Aluminum, nickel, and alloys.**

**2/ For cut nails and spikes, see report entitled "Principle Manufactures from Rolling-Mill Products."**

**3/ For cut tacks, see report entitled "Principal Manufactures from Rolling-Mill Products."**

**4/ Not including electrodes. For production of electrodes, see report for "Electrical Machinery, Apparatus, and Supplies."**

**5/ Wire guards, partitions and grilles, kitchen wire goods, floral designs, wire lamp-shade frames, bird cages, garment hangers, etc.**

**6/ The insulated wire and cable. The figures here given cover the total production, of insulated wire and cable, except armored cable, data for which are included in the item for "Armored conductor," under "Conduit, fittings, and armored cable" in the report for the "Electrical Machinery, Apparatus, and Supplies" industry.**

# British Wire Research Papers

A Digest of the Papers Relating To Wire Manufacture As Presented At the 26th Annual Meeting of the Institute of Metals (Great Britain) Sept. 3 6, 1934.

**Paper (668) "The Influence of Pickling on the Fatigue-Strength of Duralumin." By H. SUTTON, M. Sc., Member, (Senior Scientific Officer and Head of Metallurgical Department, Royal Aircraft Establishment, South Farnborough), and W. J. TAYLOR, (Technical Officer, Royal Aircraft Establishment, South Farnborough).**

✦ ✦ ✦

IN order to assist in the detection of flaws, manufacturing defects, and fatigue cracks in aluminum alloy components it has been customary to pickle or etch the components in various solutions, the main etching usually being effected in an aqueous solution of caustic soda. Wohler-type fatigue tests were made on test-pieces machined from Duralumin bar and the effect of various pickling treatments on the fatigue-strength was investigated.

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PICKLING Treatment A (2½ minutes in 10 per cent. caustic soda solution at 60° to 70° C.; rinse; 1 minute in 10 per cent. nitric acid, 10 per cent. sulphuric acid) lowered the fatigue limit by 31 per cent., but the reduction was very much less after immersion of the test-pieces in boiling water. After a layer of 0.0025 in. thick had been machined off, the pickled test-pieces showed normal fatigue properties.

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PICKLING Treatment B (2 minutes in 10 per cent. hydrofluoric acid, 10 per cent. nitric acid) lowered the fatigue limit by 15 per cent.

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PICKLING Treatment C (3 minutes in 10 per cent. sulphuric acid 4 parts, hydrofluoric acid 1 part; rinse; 1 minute in 50 per cent. nitric acid) only lowered the fatigue limit by about 6 per cent. and the reduction was less still, i.e., within the limits of experimental error, when the specimens had been immersed in boiling water after being pickled. This treatment appears suitable for pickling new components to reveal macro-structure and defects, or for etching used components for the detection of fatigue cracks, stress-corrosion, cracks, etc.

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**Paper (667) "Some Properties of Heavily Cold-Worked Nickel", By H. QUINNEY, M. A., Member, (University Engineering Laboratory, Cambridge).**

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THE Curie point of commercial nickel of 99.62 per cent. purity has been found to be 330°C., which is much lower than that generally accepted for pure nickel. After the metal has been subjected to torsional overstrain the Curie point on heating is raised considerably but returns to its original value on cooling. No such effect is observed with mild steel since the strain is relieved before the metal reaches the relatively high Curie point.

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**Paper (670) on "Experiments in Wire-Drawing. Part IV.—Annealing of H.-C. Copper Wires of Varying Hardness-Elongation Values." By W. E. ALKINS, M.Sc., Member (Research Department, Thomas Bolton & Sons, Ltd., Oakamoor), and W. CARTWRIGHT, O.B.E., M.Sc., Member, (Research Department, Thomas Bolton & Sons, Ltd., Oakamoor).**

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IN the preceding paper of this series, the authors gave an account of annealing experiments carried out at varying temperatures for varying lengths of time upon a number of samples of wire, approximately one-tenth inch in diameter, drawn with widely varying amounts of reduction, from a single heavy wire-bar of very pure h.-c. copper. The breaking load of the wires was the only physical property then dealt with.

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IN response to a generally expressed desire, the results of the elongation determinations upon the same wires after the same heat treatments are now published, though no detailed correlation of the breaking load and elongation data is undertaken.

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THE results again bring out the fact that the more severely drawn wires become annealed at much lower temperatures than the less hard wires. "Over-annealing", in the sense of falling-off in percentage elongation values, is apparent when an annealing temperature of 750° to 850°C. is adopted.

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MAXIMUM elongation values are obtained by annealing for a relatively long time (12-24 hrs.) at a comparatively moderate temperature (230° - 280°C.) wires drawn with a reduction of area of the order of 50-75 per cent.

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**Paper (672) "Crystal Densities of Industrial Brasses from X-Ray Data". By Professor E. A. OWEN, M.A., D.Sc., Member, (Professor of Physics, University College of North Wales, Bangor), and Llewelyn PICKUP, M.Sc., Ph.D., (Uni-**

**versity College of North Wales, Bangor).**

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CRYSTAL density values have been obtained from X-ray data of copper-zinc alloys in thermal equilibrium, for compositions in the α—, (α+β), and β-regions. Whilst it is shown that the degree of porosity, cold-work, and grain-size have no effect on the results obtained, it is essential to take into account the heat treatment given, when interpreting the values of alloys with duplex structures.

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THE relation between the composition of the pure α-phase and its density is not strictly linear, but both that of alloys in the pure β-region and that in the (α+β) region can be taken as linear to a high degree of accuracy. At the phase boundaries (α) — (α+β) and ($\alpha^1$+β) — (β) there are discontinuities in this relation.

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DENSITIES derived from X-ray data are considered to be nearer the true values than those obtained by any of the other methods hitherto employed, and hence, for copper-zinc alloys in true equilibrium the values obtained are the most reliable standards available for comparison purposes.

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**Paper (678) "Elongation Values of Copper and Copper-Rich Alloys." By Maurice COOK, Ph.D., M.Sc., Member, (Assistant Research Manager, I. C. I. Metals, Ltd., Witton, Birmingham) and Eustace C. LARKE, (Physical Testing Laboratory, I. C. I. Metals, Ltd., Witton, Birmingham).**

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A study has been made of the effect on elongation values of dimensional variations in test-pieces of copper and copper alloys in strip form. H.C. copper, 70 : 30 and 64 : 36 brass. 80 : 20 cupro-nickel, and 95.5 gilding metal have been investigated, and it has been found that varying the length of parallel portion on 0.5 in. wide test-pieces from 1.5 to 8.5 in. has no appreciable effect on the total elongation values measured on a 1 in. gauge-length. Varying the metal thickness between 0.125 and 0.020 in. does not sensibly affect the elongation, but with metal thinner than 0.20 in. the elongation values decrease with decreasing thickness. With variation in width from 0.25 to 1.5 in. the elongation decreases with decreasing width, the effect being smaller as the gauge-length is increased. Variation in the rate of strain between the limits of 0.06 and 0.55 in. per inch of gauge-length per minute does not appear to affect the elongation values.

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THE effect of gauge-length on elongation values has been considered in detail for the five materials in the soft condition and for 70 : 30 brass of varying hardness, and a study made of the distribution of elongation along the gauge-length. Values for total and uniform elongation have been obtained and compared with those derived from characteristic formulae such as those of Unwin, Bach, Bertella, and Krupkowski. The extent of the effect of the local elongation due to necking has been investigated and its influence in connection with the effect of position of the fracture on the elongation considered.

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**Paper (671) "Crystal Re-Orientation on Heating Drawn Copper Wires." By G. S. FARNHAM, B. A., M.Sc., Member, (Research Metallurgist, The University, Manchester), and Hugh O'NEILL, M. Met., D.Sc., Member, (Senior Lecturer, Department of Metallurgy, The University, Manchester).**

✦ ✦ ✦

THE behaviour of a silver-free copper wire reduced 50 per cent. by cold-drawing, has been compared after "low-temperature treatment" (L.T.T.) with that of two silver-bearing wires reduced 59 per cent. and 49 per cent. respectively. L.T.T. hardening occurs in the first, but not in the last of these. X-ray spectroscopy makes it evident that preferred orientation is less developed in the silver-bearing wires. The general effect of L.T.T. at 130°C. is to reduce the amount of [111] preferment, but to cause an increase of [100] preferment. This change-over probably causes "orientation hardening." In the silver-bearing wires, however, the change is only relatively small in extent, and this appears to explain the differences as regards L.T.T. hardening.

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**Paper (679) "The Deformation Lines in Alpha Brass." By Carl H. SAMANS, Ch.E., M.S., Ph.D., Member, (Chase Brass & Copper Company, Waterbury, Conn., U. S. A.).**

✦ ✦ ✦

A microscopic study of 70 : 30 brass single crystals of two different orientations which had been reduced 50 per cent. in thickness by cold-rolling revealed the presence of many of the so-called "lines of deformation." X-ray determinations, by the Davey-Wilson method, of the orientations in the rolling plane showed conclusively that the markings were mechanical twins parallel to octahedral planes.

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**Paper (680) "The Spectrographic Detection and Estimation of Minute Quantities of Impurities in Copper". By M. MILBOURN, B.Sc., Member, (Research Physicist, I.C.I. Metals, Lt., Birmingham)**

✦ ✦ ✦

AN accurate and convenient method is described for the detection and estimation of small quantities of bismuth, arsenic, lead, iron, nickel, silver, antimony, and tin in copper. Details of technique, sensitivity, and line intensity comparisons are given.

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**Paper (681) "The Spectrographic Analysis of Some Alloys of Aluminium". By Ernest H. S. van SOMEREN, B.Sc., Member, (London).**

✦ ✦ ✦

THE paper describes the technique of analyzing aluminium alloys by means of their spark spectra in the ultra-violet, using the method of internal standards.

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TABLES are given for the estimation of copper, zinc, iron, silicon, manganese, magnesium, nickel, tin, and cadmium; and also for the detection of lead, antimony, chromium, titanium, and bismuth.

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**Paper (682) "A Synthetic Spectrum" Method of Analysis and Its Application to the Quantitative**

(*Please turn to page 465*)

# 'Round the World With the Wire Industry

### German Notes

THE situation on the wire export market is at present slowly improving. Since June each consecutive month brought higher shipments, but prices had to be further reduced to meet Japanese and European outsider competition. Business on wire nails has been done on a basis of £ (gold) 4.17.6 and for barbed wire below £ 8.0. The domestic demand is unusually great for this time of year, as October is usually a very slack month, but this year orders are still coming in freely. Wire rod exports suffer from outsider competition, whereas the domestic demand is more satisfactory.

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EXPORTS of wire rope are improving. During the first 9 months of this year 6,411 tons were exported compared with 5,588 tons last year. The competition however is very keen and prices had to be reduced. The present average price of one ton wire rope is 440 Marks ($180) as compared with 470 Marks last year.

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BARTER trading in the wire industry is gaining favor. The bulk of the barter business is at present conducted with Africa and South America. Negotiations are proceeding with the Government of South Africa regarding exchange of a large quantity of wool against more than 3000 tons of wire products. Exporters have found that trading by barter is good business as much better prices can be realized. For example in Guatemala, coffee and bananas were given in trade for steel and wire (approximately 186 tons of fencing wire). German prices were far superior to those of American and Japanese but the sellers in Guatemala of coffee and bananas preferred the exchange with German products as it was the only way of disposing of their surplus crop which otherwise would probably have been destroyed. It was therefore a profitable transaction for them to get the wire and steel from Germany for their own products.

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THE establishment of new wire and wire nail factories in Germany is prohibited except with a special license from the Government which might be granted in special cases. Labor saving machinery has also been prohibited except in cases where the factory can prove that the number of men on the payroll will not be reduced by the establishment of new machinery and if the company can prove that the products made by the new machinery will be sold for export. Only in this case will permission be granted.

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NEARLY 15,000 Labor Service men are at present engaged in the huge land reclaimation scheme on the West Coast of Schleswig (North Sea) where most of the land lost to the sea in the past centuries will be regained by a 20 year plan (nearly 2000 square miles). This work requires very great quantities of wire. This year the first two new villages were founded. It is estimated that the total amount of wire used will exceed 60,000 tons, and that netting, mesh and fencing wire will be used chiefly.

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### German "Barter" With India

A BARTER trade agreement has been signed by Germany with India on the basis of 2500 tons of wire rods against a proportional quantity of steel scrap.

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### Russia Buying from Germany

RUSSIAN shipments through the Kaiser Wilhelm Kanal (connecting the Baltic and the North Sea), during first half of 1934, included not less than 16,000 reels of barbed wire for Wladivostok and more than 1800 tons of signal, telephone and telegraph wires. It is not known what quantity has been sent by rail. Russia has also placed a small order in Germany for shipment to the Far East.

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### Indian Steel and Wire Company Makes Additions

A NEW small section and wire rod mill for the Indian Steel and Wire Products Company, at Tatanagar, India, was put in operation in August, 1933. At present, the rolling schedule comprises bars of wire rods ranging from one-quarter inch to one-half rounds or squares; however, in the future, also bars up to three-quarters inch, angles up to one inch and corresponding T-sections, etc., will be manufactured . The complete plant has an average output of 60 tons in 8 hours.

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### Slight Rise in Canadian Wire Nail and Spike Production

ACCORDING to figures released by the Department of Trade and Commerce, Dominion Bureau of Statistics, Mining, Metallurgical and Chemical Branch, Ottawa, production of wire nails and spikes in Canada during 1933 (32,989 metric tons) was 1,938 tons greater than during the preceding year.

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CANADIAN receipts of "wire roofing nails of all sizes and wire nails of one inch or more in length, of iron and steel, coated or not", during 1933 (58 tons) were below 1932 imports by 140 tons; those of "wire nails less than one inch in length and nails, and brads, not otherwise provided for", (19 tons) declined 10 tons under 1933 figures; while "cut nails of iron and steel, coated or not", rose by 3,300 pounds over the earlier year. Exports of wire nails during 1033 (2,615 tons) registered a gain of 2,025 tons over those made during the previous year, and shipments of "nails, brads, spikes and tacks of iron and

# 'Round the World With the Wire Industry

steel, of all kinds, not otherwise provided for" (689 tons) gained 350 tons over the previous year.

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### Germany Turning To Aluminum

THE increasing use of aluminum at the expense of copper is becoming very noticeable in certain Western European countries, especially in Germany, which has now prohibited the use of copper in high-tensioned cables. Unless special permission is granted by the State Metal Supervision Office any cables erected must henceforth be made of aluminum, as the value of imported bauxite used as raw material is only 10 per cent of the cost of the finished metal. The principal factors influencing the price of aluminum are wages and the cost of the electricity.

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THIS new German decree is of particular importance, as some large overhead electric cable projects are to be carried out in connection with railroad electrification in that country in the near future.

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### Big Ropes For World's Largest Liner

BRITISH ROPES, LTD., the big British wire rope manufacturing combine, is making at its Rutherglen works the launching checks and drags for the giant Cunarder now under construction on the Clyde. These ropes will be 7 inches and 7½ inches in circumference, and will have large thimbles spliced at each end. The total weight of the order is nearly 50 long tons (or about 56 short tons). Delivery will be made early in August.

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### Indian Tariff Regulations

THE forthcoming Session of the Indian Legislature will consider a Bill based on the recommendations of the Indian Tariff Board in a report on the Indian iron and steel industry which has just been published. The broad effect of the recommendations is to extend the protection the industry has had for the past ten years to March 31, 1941, and to extend the application of the principles of the Ottawa agreement. While United Kingdom goods will continue to pay "revenue" duties, they are either exempted from the protective schedule or pay far lower rates than those applied to foreign countries.

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IRON and steel was the first industry to which the policy of discriminating protection, adopted at the instance of the Indian Fiscal Commission, was applied in 1924. Looking back on the past decade, the Tariff Board finds that the industry has made substantial progress, maintainings its output and greatly reducing its production costs. The share of the available Indian market obtained by the Tata enterprise—the predominant beneficiary—rose from 30 per cent in 1927-28, when the revised scales were introduced, to 72 per cent. in 1932-33.

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IN the tariff existing before the Ottawa Conference, lower rates were levied on certain classifications of United Kingdom iron and steel—not in the interests of the United Kingdom, but in those of India. The Indian delegation at Ottawa held that these rates could not become the subject of bargaining there, as any modification of them must be postponed until the Government had before it the results of the statutory inquiry. It was agreed, however, to grant a 10 per cent. preferential duty on all unprotected items which are subject to revenue duty under specified classifications. These included such important items as fencing wire, hoops and strips, and numerous Sheffield specialties. The standard rate on these items being 20 per cent., the preferential rate on British shipments was 10 per cent. The Board finds that the agreement has been successful and beneficial as regards Indian pig iron.

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AFTER detailed examination of present and future works costs of the Tata company, the Board bases its proposals on "a fair selling price which is comparable with the landed prices of imported goods."

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WHILE commercial bolts and nuts from Britain escape protective duties, rival manufacturers from other countries are chargeable with substantial amounts. On dogspikes, gibs, cotters, keys, and other railroad material United Kingdom shipments will pay only about one-seventh of the duty charged on Continental products.

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THE Board recommends for wire rod, small bars, and sections the same duties that have been fixed for bars of the classes already protected—namely, 10 rupees on United Kingdom shipments and 39 rupees on those from other countries. The duties proposed on wire and wire nails are 25 rupees on United Kingdom and 60 rupees on other shipments.

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THE severest competition in wire products comes from Japan, and it is proposed that dumping prices lower than those assumed by the Board in determining the duty should be dealt with by the operation of the provision for off-setting duties. The protective duties on wire and wire nails are to be confined to those classes already protected.

# Exports and Imports of Wire

**Exports of Iron and Steel Wire Products in Sept., 1934 and Sept., 1933**
**(In gross tons)**

| | Sept. 1934 | August 1934 | September 1933 |
|---|---|---|---|
| Wire rods | 1,293 | 1,414 | 428 |
| Hoops, bands and strip steel | 1,079 | 1,840 | 1,729 |
| Plain black or galvanized iron or steel wire | 3,237 | 3,532 | 2,847 |
| Barbed wire and woven wire fencing | 2,779 | 3,752 | 3,283 |
| Woven wire screen cloth | 164 | 133 | 70 |
| Wire rope | 219 | 158 | 135 |
| Insulated iron or steel wire and cable—see analysis below | | | |
| Other wire and manufactures | 444 | 323 | 229 |
| Wire nails | 875 | 996 | 1,050 |
| Tacks | 39 | 38 | 47 |
| Other nails, including staples | 241 | 409 | 301 |
| Bolts, machine screws, nuts, rivets and washers | 450 | 463 | 327 |
| Total, these 11 classifications | 10,820 | 13,058 | 10,446 |

**Imports of iron and steel wire and wire products into the United States**
**(In gross tons)**

| | | | |
|---|---|---|---|
| Concrete reinforcement bars | 161 | 142 | 147 |
| Hollow bars and drill steel | 150 | 95 | 108 |
| Merchant steel bars | 1,507 | 1,580 | 2,559 |
| Wire rods | 339 | 720 | 693 |
| Barbed wire | 533 | 830 | 434 |
| Round iron and steel wire | 138 | 187 | 171 |
| Telephone and telegraph wire | | 19 | |
| Flat wire and strip steel | 178 | 245 | 143 |
| Wire rope and strand | 139 | 170 | 144 |
| Other wire | 34 | 71 | 108 |
| Hoops and bands | 1,477 | 2,323 | 2,461 |
| Nails, tacks and staples | 599 | 428 | 712 |
| Bolts, nuts and rivets | 8 | 19 | 3 |
| Total, these 13 classifications | 5,263 | 6,829 | 7,683 |

THE trade with Japan—for the third consecutive month—recorded a new high, the September volume of 168,342 tons registering 54,056 tons above that of the previous month. This trade was chiefly made up of 161,401 tons of scrap, 4,449 tons of tin plate, 200 tons of 'other plate', 127 tons of plain structural shapes, 102 tons of pig iron, and 101 tons of steel bars. Italy's participation to the extent of 21,285 tons placed that country in second position; however, this tonnage was practically all made up of scrap. Canada's purchases amounted to 15,177 tons and included 5,300 tons of scrap, 2,317 tons of plain structural shapes, 1,418 tons of black steel sheets, 990 tons of skelp, 645 tons of steel bars, and 543 tons of 'other plate'. Scrap accounted for all of the 13,090-ton participation of Poland and Danzig, while Mexico, with purchases aggregating 9,340 tons, was the fifth market of importance. Brazil ranked sixth with purchases aggregating 6,660 tons, included among which were 2,000 tons of tin plate, 1,919 tons of heavy rails, 833 tons of galvanized steel sheets, 545 tons of barbed wire, and 241 tons of rail joints, splice bars, fishplates, and tie plates.

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PIG iron was easily the leading product received on a tonnage basis, the 12,290 tons purchased coming chiefly from the Netherlands (5,944 tons), Canada (3,184 tons), and British India (2,762 tons). The second product of importance was ferro-manganese and spiegeleisen, the aggregate 1,985 tons chiefly supplied by Canada (955 tons), Norway (593 tons), the United Kingdom (194 tons), and France (177 tons). Structural shape receipts, 1,877 tons, followed—the chief countries of supply included Belgium (1,590 tons), France (156 tons), and Germany (131 tons). Ranking fourth was merchant and other steel bars—1,507 tons—with Belgium (1,065 tons) easily the outstanding supplier, followed by Germany (189 tons), and Sweden (183 tons). Hoops and bands, 1,477 tons, came principally from Belgium (1,070 tons), and Germany (361 tons), while the sixth item of the month, 1,157 tons of scrap, was practically all supplied by Canada.

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THE Netherlands continued as the chief source in the supply of iron and steel products to the United States, its total of 6,005 tons—including 5,944 tons of pig iron—accounting for 25.6 percent of the aggregate—Canada with a total of 5,394 tons assuming second position and accounting for 22.6 percent of all iron and steel products received during the month. This total included 3,184 tons of pig iron, 1,123 tons of scrap, and 955 tons of ferro-manganese—and spiegeleisen. Belgium's total of 4,571 tons accounted for 19 percent of the aggregate, and placed that country in the position of the third most important supplier for the month as against second place last month. During the month under review Belgium's total was composed chiefly of 1,590 tons of structural shapes, 1,070 tons of hoops and bands, and 1,065 tons of merchant and other steel bars. British India was the next supplier of importance, participating to the extent of 2,762 tons and accounting for 11.6 percent of the September imports, this amount being composed entirely of pig iron. Germany ranked fifth with participation to the extent of 2,036 tons—8.5 percent of the aggregate—composed chiefly of 539 tons of nails, tacks and staples, 384 tons of barbed wire, 361 tons of hoops and bands, 189 tons of merchant and other steel bars, and 131 tons of structural shapes. Sweden's total of 1,180 tons—4.0 percent of all received—included 315 tons of wire rods, 183 tons of merchant and other steel bars, 171 tons of flat wire and strip steel, 121 tons of round iron and steel wire, and 105 tons of hollow bar and drill steel.

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A FURTHER drop was recorded in card clothing receipts, the total of 6,756 square feet valued at $10,735 falling below August imports of 8,244 square feet valued at $11,111. Of this total, the United Kingdom furnished 6,696 square feet valued at $10,346, and Switzerland 60 square feet valued at $389. (*Please turn to page 460*)

# A Review of Recent Wire Patents

No. 1,975,114, MANUFACTURE OF SPRINGS, Patented October 2, 1934 by Georg Masing, Berlin, and Otto Dahl, Berlin-Charlottenburg, Germany.

This spring comprises a heat hardened copper-beryllium alloy containing from about 0.3 to 12 per cent by weight of beryllium with the remainder substantially copper.

✦ ✦ ✦

No. 1,975,155, COILED WIRE CUTTING MACHINE, Patented October 2, 1934 by Clarence J. Keller, Anderson, Ind., assignor, by mesne assignments, to General Motors Corporation, Detroit, Michigan, a corporation of Delaware.

In the operation of this machine, the coiled wire is cut without stopping the feeding of the wire into the machine.

✦ ✦ ✦

No. 1,975,620, COIL WINDING MACHINE, Patented October 2, 1934 by William F. Saul, Westmont, N. J.

The machine may be adjusted to wind a coil of any predetermined capacity, induction or resistance.

✦ ✦ ✦

No. 1,975,756, COIL STICKING MACHINE, Patented October 2, 1934 by David L. Summey, Waterbury, Conn. The Colonial Trust Company and Richard P. Weeks Summey, executors of said David L. Summey, Deceased.

More particularly, this machine is adapted for opening the coil end and for sticking the end properly in the coil. It is stated to be useful in the rolling mill industry.

✦ ✦ ✦

No. 1,976,247, WIRE DRAWING MACHINE, Patented October 9, 1934 by Wilhelm Rohn, Hanau-on-the-Main, Germany.

Specifically, this is a multiple wire drawing machine having a simple base plate and a number of separate units screwed on the base plate and being readily removable as units, each unit consisting of an electric motor as a driving element and with a drawing drum fitted to the shaft of the unit. By the use of this machine, the necessity of elongate gear train is eliminated.

✦ ✦ ✦

No. 1,976,305, LUBRICATED SCREW, Patented October 9, 1934 by Paul G. Swanson and Erik Harold Ericsson, Rockfort, Illinois, assignors to Elco Tool & Screw Corporation, Rockford, Ill., a corporation of Illinois.

The screw is an ordinary wooden screw having a lubricant coating upon the unthreaded portion, this coating comprising hard soap, bees wax, stearic acid, potash and water.

✦ ✦ ✦

No. 1,976,357, MACHINE FOR STRAIGHTENING, DRAWING AND POLISHING RODS, Patented October 9, 1934, by Heinrich Moller, Ergste, near Schwerte, Germany, assignor to the firm Schumag Schumacher Metallwerke Aktien-Gesellschaft fur Prazisionsmechanik, Aachen, Germany.

Included in this machine are two drawing tongs mounted upon a drawing carriage.

**Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 17 East 42nd St., New York.**

No. 1,976,871, APPARATUS FOR MAKING A VOLUTE SPRING, Patented October 16, 1934 by William E. Wine, Toledo, Ohio.

More specifically, this apparatus is adapted for making railway car truck springs.

✦ ✦ ✦

No. 1,977,209, ELECTRIC CABLE, Patented October 16, 1934 by Alfred Sargent. Derby, England, assignor to The Macintosh Cable Company Limited, Derby, England, a British Company.

The claim in this patent is a method claim for manufacturing the cable, the cable being such as would require repeated bending of comparatively small radius (such as mine trailing cables).

✦ ✦ ✦

No. 1,977,325, HIGH VOLTAGE CABLE, Patented October 16, 1934 by William Pfannkuch, Berlin-Wendenschloss, Germany, assignor to General Electric Company, a corporation of New York.

This cable comprises in addition to the wire conductor and insulation thereabout, an impervious sheath with a filling of impregnating liquid. Within the sheath a polymerized product of the acrylic acid series containing small individual bubbles of gas. It is stated that with this expansion means within the sheath, the bubbles of gas will not be able to coalesce.

✦ ✦ ✦

No. 1,977,361, METHOD OF PREPARING AND COMPOSITION OF RODS OF HARD FACING MATERIAL, Patented October 16, 1934 by Clifton Taylor, Pittsburgh, Pa., and Joseph A. Weiger and George N. Sieger, Indianapolis, Ind.

The inventors aim to provide a rod having a sintered hard casing, which rod may be subjected to hard wear and abrasion. The rod comprises nickel, carbon, iron and ferro-alloys of chromium and tungsten.

✦ ✦ ✦

No. 1.977,476, SPRING CUSHION CONSTRUCTION, Patented October 16, 1934 by Henry F. Hager, Trenton, and Charles F. McCoy, Pennington, N. J., assignors to Trenton Spring Products Company, Trenton, N. J., a corporation.

It is claimed that the effect of a knotted coil spring is obtained in this spring cushion construction without knotting.

✦ ✦ ✦

No. 1.977,556, APPARATUS FOR FINISHING BOLT HEADS AND POINTS. Patented October 16, 1934 by Henry J. Hogue, Lakewood, Ohio, assignor to The Wasmer Bolt & Nut Company, Cleveland, Ohio, a corporation of Ohio.

Simultaneously with the formation of threads on the bolt, screw or the like, the heads are finished.

No. Reissue 19,347, SPRING CONSTRUCTION AND METHOD OF MAKING SAME, Patented October 23, 1934 by Oliver Hetherington, West Chester, Pa., assignor to Peerless Springs, Incorporated, West Chester, Pa., a corporation of Pennsylvania.

This construction includes the conventional helical upholstery springs having spiral end coils and arranged with an end coil of each overlapping the other, with a wire hinge member having its respective end portions coiled about and firmly embracing the end coils mentioned at the points of contact with each other.

✦ ✦ ✦

No. Reissue 19,348, SCREW AND BOLT AND PROCESS OF MAKING THE SAME, Patented October 23, 1934 by Charles Kaufman, Garfield Heights, Ohio, assignor to Pittsburgh Screw and Bolt Corporation, Pittsburgh, Pa.

The method of making bolt and screw blanks comprises drawing a portion of a length of stock of cross sectional area greater than that of the shank of the blank to form a round cross section of a diameter equal to the overall diameter of the threads of the finished article. Then drawing down a portion of the round cross section to a diameter equal to the pitch diameter of the threads and finally upsetting the unreduced portion of the stock to form a head.

✦ ✦ ✦

No. 1,977,744, CABLE WRAPPING MACHINE, Patented October 23, 1934 by Charles C. Sunderland, Trenton, N. J., assignor to John A. Roebling's Sons Company, Trenton, N. J., a corporation of New Jersey.

This machine is adapted for wrapping wire about cables of suspension bridges after the cables are in place.

✦ ✦ ✦

No. 1,977,787, THREE-CONDUCTOR CABLE. Patented October 23, 1934 by Hans V. Wodtke, Plainfield, N. J., assignor to Anaconda Wire & Cable Company, New York, N. Y., a corporation of Delaware.

In this three-conductor cable, the bare or neutral conductor lies between the two insulated wire conductors and is consequently well spaced from the sheath.

✦ ✦ ✦

No. 1.977,932, COATING COMPOSITION, Patented October 23, 1934 by William Howard Wright, Schenectady, N. Y., assignor to Schenectady Varnish Company, Inc., Schenectady, N. Y., a corporation of New York.

More specifically, this coating composition is a wire enamel comprising a drying oil, a resin, and a solvent comprising a hydrogenated petroleum product (known to the trade as Hydrosolvent).

✦ ✦ ✦

No. 1.978,050, APPARATUS FOR LIMING WIRE, Patented October 23, 1934 by Charles D. Johnson, Worcester, Mass., assignor to Johnson Steel & Wire Company, Inc., Worcester, Mass., a corporation of Massachusetts.

The apparatus includes a tank for containing the bundles of wire having

(*Please turn to page 459*)

# THE DETAILED DISCUSSIONS

At The

# WIRE ASSOCIATION MEETINGS

Held At New York, October 1-5, 1935

Are Available In The Form of Typed Stenographic Minutes of The Sessions

✦ ✦ ✦

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Micro Model "T" Automatic Butt Welder for close accuracy in heavy duty service.

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For a uniformly high-grade welding job at high speed under the hardest kind of service, you can depend on Micro-Welders . . . they are the only welders equipped with the patented Micro-Weld adjustment dials for faster precision welding.

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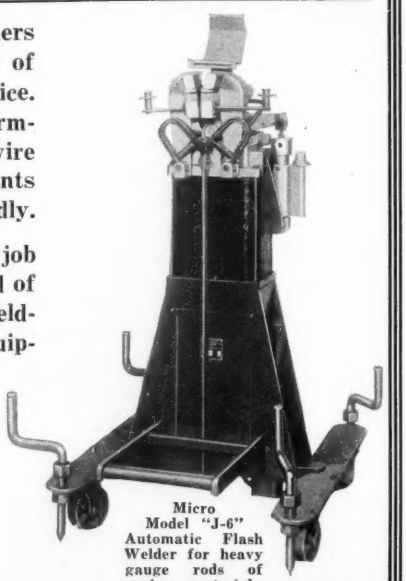

Micro Model "J-6" Automatic Flash Welder for heavy gauge rods of various materials.

Trade Mark Reg. U. S. Pat. Off.

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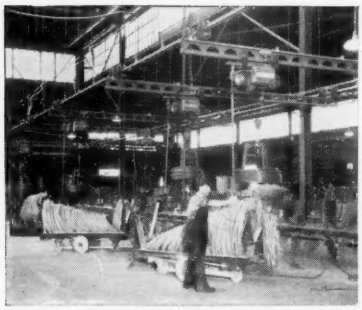
Factory and General Office
PEORIA, ILLINOIS

### Material Handling Equipment For Columbia Steel Company

AS a part of its plant modernization program, the Columbia Steel Company of Pittsburgh, California, recently completed the installation of electrical crane and hoist equipment to speed production.

✦ ✦ ✦



AMONG the most noteworthy improvements is the new method employing hoists for block stripping in the wire mill. The photo shows in operation several of the seventeen P&H-Milwaukee hoists installed for this purpose. They are P&H type R-¼ equipped with Cleveland Tramrail trolleys. With but one 220 volt motor, and equipped with rigid arm push button control, these hoists have a capacity of 600 pounds and a lifting speed of 34 feet per minute.

✦ ✦ ✦

ACCORDING to officials of the company, this application of hoist equipment has proved to increase efficiency in the handling of bulk wire and the economy foreshadows a similar use in other wire mills.

✦ ✦ ✦

### A Review of Wire Patents

(*Continued from page 455*)

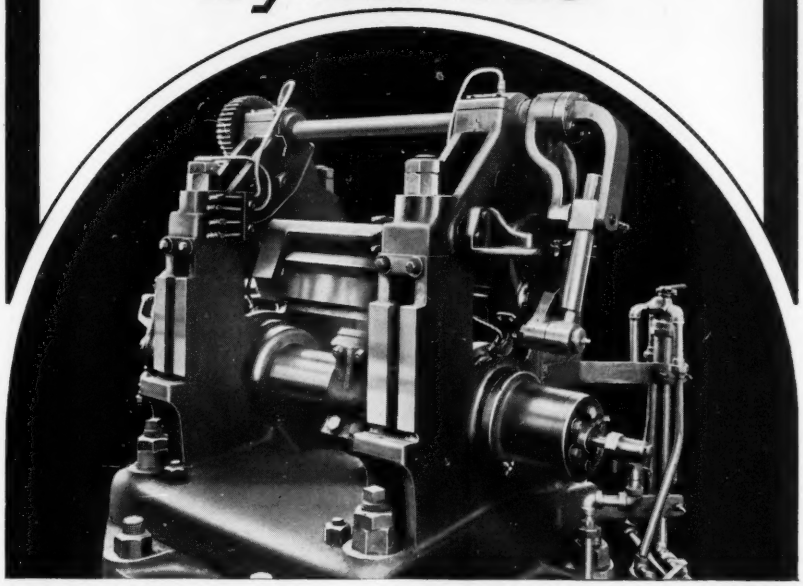
a hopper secured to the side wall of the tank and a screen forming the partition or dividing wall between the hopper and the tank. A pump is provided having its inlet connected to the bottom of the tank and its discharge delivering into the hopper and operating to withdraw lime water from the tank and deliver it to the hopper, the lime water of course, flowing through the screen.

✦ ✦ ✦

No. 1,979,063, METHOD OF MANUFACTURING WIRE CLOTH BELTS, Patented October 30, 1934 by John Robert Buchanan and Thomas Michael Cray, Ottawa, Ontario, Canada.

The method comprises joining the warp end of the belt by brazing, soldering, welding or fusing but by first reenforcing the ends of the wire cloth.


# FLYING SHEAR *by LEWIS*



## FOR ROD MILLS, BAR MILLS AND STRIP MILLS

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Mill drives up to and including 6,000 HP. Shape Straightener Machines up to and including 24 inch I beam. Motor operated Screw-Down for Mill. High Speed Gear Sets for Continuous Rod Mills. Continuous Bar and Billet Mills. Cold Mills for Sheet and Strip. Rail Breakers. Rail Re-Rolling Mills. Universal Mill Spindles. Chilled Iron and Iron Alloy Rolls for Iron, Steel, Brass, Copper, Aluminum, Zinc and Nickel. For hot Sheets, tin plate and strip—for cold sheets, tin plate and strip. For merchant bars and rods, Shears—Vertical Alligator—Cropping—Plate and Squaring. Special Machinery—Testing Machines and Iron and Steel Castings.

PITTSBURGH, PA.

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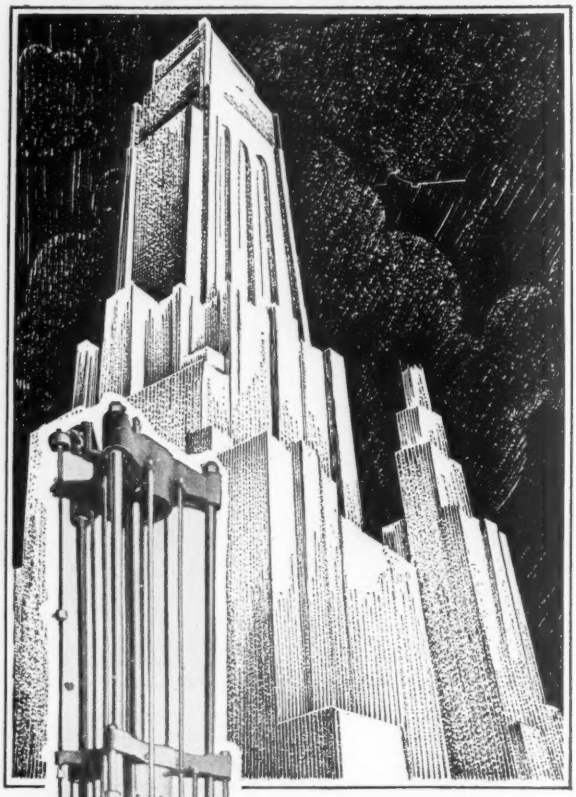
MODERN



THE ROBERTSON
Hydro-Pneumatic
ACCUMULATOR

The Robertson Accumulator bears the same relation to the old cumbersome, space-taking accumulator still in use that the modern office building with express elevators bears to the antiquated loft building having long, narrow stairways.

It takes up the very minimum of space—Requires no heavy foundation—Operates at low air-pressure (only 175 lbs.)—Is equipped with automatic auxiliary air compressor (which maintains consistent pressure in cylinder and storage tank)—Is positive and quick acting—Is absolutely safe—and, finally, IT GIVES LOW COST, HIGHLY EFFICIENT, TROUBLE-FREE SERVICE. Write for literature.

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John ROBERTSON CO. INC. Pioneers-Since 1858

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## Bessemer and Open Hearth Steel Wire

(*Continued from page 444*)

use. In some cases they limit us to a weight of say 200 lbs. With our billets the rod bundles will weigh around 340 lbs. when cleaned and we would have to assume the 140 lbs. scrap possibly if it could not be used for some other purpose.

✦ ✦ ✦

WE have other customers who want bundles weighing not less than 600 lbs. and up to 1,500 lbs. that we, of course, could not furnish unless we resorted to electrically welding the bundles together, which we have been able to do with a great deal of success in all sizes up to ¾" diameter.

✦ ✦ ✦

FOR the fellow who holds us to bundles of wire weighing 190 lbs. to 210 lbs. we weld the rods together and by means of a revolution counter on the wire block, and knowing the weight of the wire per foot the number of revolutions of the block required to get the feet and the weight, the wire drawer will stop the block and cut the wire when the required number of revolutions have been made and then continue drawing from the batch of welded rods and repeat the operation.

✦ ✦ ✦

## John F. Kelly

### Managing Director, Association of Iron and Steel Electrical Engineers

**JOHN F. KELLY,** Managing Director of Association of Iron and Steel Electrical Engineers, Pittsburgh, Pa., passed away on Friday, Nov. 16, 1934.

✦ ✦ ✦

MR. Kelly was widely known throughout the entire steel industry and was highly regarded by his many friends.

✦ ✦ ✦

IN his work as managing director of the Association, Mr. Kelly was most efficient and his loss will be keenly felt.

### Harold Smith Elected Vice President of Westinghouse

HAROLD SMITH has been elected Vice President of the Westinghouse Electric International Company, according to a recent announcement by G. H. Bucher, president of that organization.

✦ ✦ ✦

MR. Smith joined the personnel of Westinghouse in 1919 as a member of the legal department of the Westinghouse Electric and Manufacturing Company. In 1926 he was appointed General Solicitor and in 1929, Vice President.

✦ ✦ ✦

PRIOR to his connections with Westinghouse, Mr. Smith was engaged in the practice of law in Chicago as a member of the firm of Glennon, Cary and Walker. He is a graduate of Northwestern University (LLB. in 1905) and of Yale (LLM. in 1906). He was also pursued studies at the University of Chicago and is a member of the bars of the states of New York and Illinois.

✦ ✦ ✦

MR. Smith's new duties will be in addition to those of his position as Vice President of the Westinghouse Electric and Manufacturing Company. His headquarters are at 30 Rockefeller Plaza, New York City.

✦ ✦ ✦

### Promotions By Keystone Steel & Wire Co.

MR. E. P. Kastien, who has been been in the employ of the Keystone Steel & Wire Co. for approximately eighteen years serving as purchasing agent, since 1921, has been promoted to the position of General Superintendent in Charge of Operations and Purchasing.

✦ ✦ ✦

### Continental Steel Promotes J. L. Schueler

J. L. Schueler, formerly Chief Metallurgist of the Continental Steel Corp., Kokomo, Ind., has been promoted to the position of Superintendent of the Steel and Wire Division.


# HIS SATANIC MAJESTY

## HAS DECREED AGAINST DURIRON

### *His Sulphur Fumes Will Not Destroy It*

THERE is no market for **Duriron** or the products of The Duriron Company in the "Lower Regions" . . . we don't even try to cover that territory.

✦ ✦ ✦

BUT as long as the "acid devils" plague manufacturers with corrosion on the top side of this old spheriod, **Duriron** will render valiant service.

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IT will handle sulphuric acid in all concentrations and at all temperatures. And for muriatic acid, **Durichlor** is equally satisfactory.

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**DURIMET** is a machinable, **low carbon**, nickel-chromium-silicon alloy steel ideal for handling sulphuric acid under oxidizing conditions.

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**ALCUMITE** is a copper base aluminum-iron alloy, available in castings and hot rolled forms, that is highly resistant to a large number of chemicals and solutions.

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STANDARD **Duriron** products are pumps, valves, pipe and fittings, tank outlets, circulating steam jets, etc. Special castings made to your order. Whenever in need of acid-resistant equipment, write for more detailed information.

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The strong passivating effect of this excellent inhibitor insures a bright finish and forms a sound basis for a bright drawing technique—

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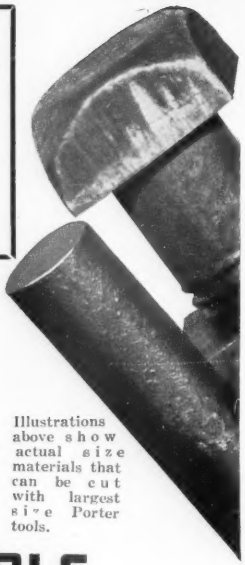
SPECIAL JAWS *for* SPECIAL NEEDS

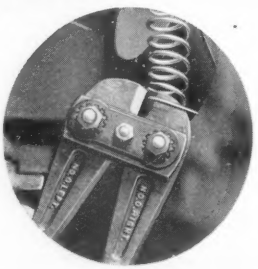


Illustrations above show actual size materials that can be cut with largest size Porter tools.

**PORTER** HKP *portable*
*two hand* **CUTTING TOOLS**

**Cutters for soft wire, spring wire, tempered wire, piano wire, stranded guy wire, wire rope and cables, insulated wires, live wires, etc., as well as for bolts, rods and bars.**

**Write for illustrated circular. Porter Tools are sold by leading jobbers and supply houses.**



**H.K.PORTER** *INC. Everett, Mass.*

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## Cold Drawn
## HIGH CARBON STEEL SPRING WIRE

**A Quality Product of Modern Metallurgical Art and Science**

***Possessing Uniformity in—***

**Tensile strength for loading capacity**
**Elasticity and resilience for spring action**
**Toughness and ductility for knotting and forming**

***Quality Insured by—***

**Scientific Control and Inspection through all stages of manufacture from the open hearth department to the shipping department**

SAMSON SPRING WIRE
**is only one of the many grades of manufacturer's wire made and sold by**

## KEYSTONE STEEL and WIRE COMPANY

**PEORIA** **ILLINOIS**


### Geo. B. Horn, General Supt. Wheeler Insulated Wire Co.

MR. **George B. Horn** has become associated with The Wheeler Insulated Wire Company in the capacity of General Superintendent and Chief Engineer.

✦ ✦ ✦

HE comes to the Wheeler Insulated Wire Company from the General Cable Corporation where from 1927 to date he served as Chief Engineer in charge of their Engineering as well as their Coil and Magnet Wire Inspection departments. ✦ ✦ ✦

MR. Horn attended both Indiana University and Purdue and graduated from the latter in 1914. After spending one year taking the General Electric Engineering Course at their Fort Wayne plant, he entered the employ of Dudlow Manufacturing Company with which company he was still associated when it became part of the General Cable Corporation in 1927.

✦ ✦ ✦

### Exports and Imports

(*Continued from page 454*)

A SMALL decline was recorded in wire cloth and screening receipts, the total of 62,652 square feet dropping 6,066 square feet under that received during the previous month. The chief suppliers included Germany with 42,198 square feet, Canada with 10,756 square feet, France with 7,868 square feet, and the Netherlands with 970 square feet.

✦ ✦ ✦

THE 652,000 square feet of wire fencing and netting galvanized before weaving was 482,000 square feet more than that received during the preceding month and was divided between Belgium, 339,000 square feet, and the Netherlands, 313,500 square feet. Of the fencing and netting galvanized after weaving, 660,000 square feet were received as compared with 1,000,000 square feet during August, and this was also supplied by Belgium, 450,000 square feet, and the Netherlands, 210,000 square feet. A very abrupt decline was recorded in wire heddle imports, totaling only 25,000 pieces—all from Germany—as compared with 1,865,000 pieces received during the previous month.

### Operating Manual For Plating With Duozinc

VALUABLE technical information on zinc-mercury plating is made available in a new and enlarged edition of the "Operating Manual for Plating with Duozinc", which has just been published by the R. & H. Chemicals Department of E. I. du Pont de Nemours & Company, Wilmington, Delaware.

✦ ✦ ✦

THE data given in the manual cover in general all phases of Duozinc plating, including preparing the material for plating, making up the solution, operation, analyzing the solution, testing the deposit, and other details.

✦ ✦ ✦

SEVERAL new sections have been included in the new issue. Among the illustrations added are those showing the effects of mercury on the structure of zinc, and Duozinc anode designs.

✦ ✦ ✦

### Digest of British Wire Research Papers

(*Continued from page 451*)

**Estimation of Small Quantities of Bismuth in Copper." By D. M. SMITH, A.R.C.S., B.Sc., D.I.C., Member, (Investigator, British Non-Ferrous Metals Research Association, London)**

✦ ✦ ✦

A method has been devised for the production of "synthetic" spectra as standards for comparison, the spectrum of a standard alloy being exactly superimposed on that of the pure metal which forms the main constituent. The total time of the two exposures is equal to the normal time of exposure of a sample which is being analyzed, and a series of spectra is obtained in which the impurity lines show a systematic increase in intensity. While the method was originally applied to the checking of the reliability of standard samples, it can be used for the quantitative determination of impurities in metals, once the standard calibration curve has been obtained. The application to the determination of 0.0001 to 0.004 per cent. of bismuth in copper is described.

Thin Rope Insulating
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Thin papers save space . . . . give greater dielectric strength ..and make a better covering at a lower cost.

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**Designed to handle reels from 60" diam. up to 120" diam.**
NEW ENGLAND BUTT COMPANY
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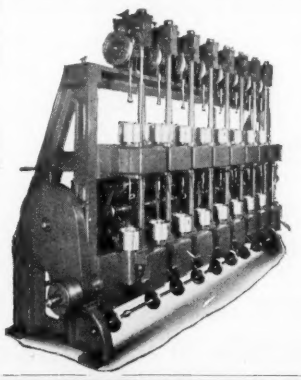
**We build a complete line of Stranding Machines, Cabling Machines, Closing Machines, Rubber Strip Covering Machines, Measuring Machines, and Other Allied Machines for the Wire Trade.**
OUR WIRE MACHINERY CATALOGUE SENT ON REQUEST



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When wire can be insulated at a lower cost on the AIMCO line of insulating machinery than on any other machines, the initial investment being less with consequent lower depreciation and maintenance charges, and the labor cost per pound of finished wire running remarkably low.
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## We Offer—Subject to Prior Sale—The Following Used Wire Mill Machinery

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Electric Resistance Pointers, Capacity .148

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Waterbury No. 1 Straight Roll Machines, With Spooling Attachment.

No. 302
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Waterbury stand spooler for fine wire.

No. 321
Electric Platform Truck Capacity 6000 lbs. Platform 41″ x 82″ x 22½″ High
24 Cells Edison A-6 Batteries

No. 342
Nilson Power Press B 2

No. 348
Five-block rod bench with gear drive and motor, 26″ and 22″ blocks.

No. 400
Twenty head enameling machine complete, capacity down to .001.

No. 401
Eight head spooler, capacity 200 lb. spools, motor driven.

No. 402
Hayes electric furnaces, automatic control, with 32 head spooler, for fine wire.

No. 403
Waterbury straight roll fine wire machines, motor and belt drive.

No. 406
Die Reaming Lathe, Semi-automatic.

No. 408
Barron and Crowther 3 hole continuous wire machines, ranges from No. 5 rod to 21 gauge.

No. 409
Wire pointers for bench or post mounting, ¼ to No. 12.

No. 418
Five 4-penny nail machines (German design)

No. 432
24 block intermediate frame with 16″ blocks, reducer, and pulley drive.

No. 438
12 block fifteen frame without drive.

No. 441
Verticle Riehle tensile testing machines, 600, 2500, and 1,000 lb. capacity.

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No. 360
Wanted
No. 1 Tor and No. 1 Universal and No. 3 Universal Sleeper & Hartley Coilers.

No. 382
Rivet Machines No. 0 or No. 1 Waterbury or Manville.

No. 384
Florist Wire Machines.

No. 411
A 5-keg nail tumbler.

No. 412
Tensile testing machine for low carbon wires No. 5 to No. 25 gauge.

No. 413
U. S. S. M. Power Eyeletting machines, type B.

No. 414
Two take-ups. 60″ reel by 32″ traverse, with jacks, and chain drive from capstan shaft, also two let-off stands, and 36 x 8 capstans with spur drive.

No. 415
Paper wrapping machine, coils 16″ to 22″, 100 lb. weight, Terkelsen 1C or equivalent.

No. 416
Small riveting machines, Townsend No. 1 or equivalent.

No. 419
Single spooler, 6½ x 6½ for No. 20 hard basic.

No. 420
4 block rod bench, 22″ c.c. 24″.

No. 423
Automatic roll feed for press, 2″ stroke, stock 3″ x 1/16″.

No. 425
Lewis-Shepard lift trucks, about 45 x 20, height 6″.

No. 426
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New England Butt. Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Brazing**
Thomson-Judd Wire Machinery Co., Lynn, Mass.

**MACHINERY—Bunching**
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Bundling, Scrap**
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Cable, Electric**
American Insulating Machinery Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

**MACHINERY—Chain Making**
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Closing**
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Coil Winding**
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Coilers**
Broden Const. Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Copper Wire Drawing and Rolling**
H. J. Ruesch Machine Co., Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.


By Arrangement With The Manufacturers' Committee of

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Wire & Wire Products

17 East 42nd Street, New York, N. Y.

# BUYERS' GUIDE, Continued

**MACHINERY—Cutting**
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Worcester, Mass.

**MACHINERY—Enameling**
American Insulating Mach'y Co., Phila., Pa.

**MACHINERY—Extruding**
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Flat Wire**
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Forming**
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Galvanizing Wire**
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Gang Winders**
H. J. Ruesch Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Grinding**
Norton Co., Worcester, Mass.

**MACHINERY—Insulating**
American Insulating Machinery Co., Phila.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Lead Encasing Presses, etc.**
John Robertson Co., Brooklyn, N. Y.

**MACHINERY—Lead Stripping**
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Lock Washer**
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Magnet Wire**
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Measuring Wire & Cable**
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Nail**
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Panning**
American Insulating Machinery Co., Phila.

**MACHINERY—Pointing**
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Rod Mill**
Broden Construction Co., Cleveland, O.
Morgan Const. Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Lewis F'dry & Machine Co., Pittsburgh, Pa.

**MACHINERY—Rolling Mill**
Broden Construction Co., Cleveland, O.
Lewis F'dry & Machine Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.

**MACHINERY—Rubber Strip Covering**
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Rubber Tubing and Straining**
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Screw Wire**
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Special**
American Insulating Mach'y Co., Phila. Pa.
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry and Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Spooling**
American Insulating Machinery Co., Phila.
Fidelity Machine Co., Philadelphia, Pa
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Spring Making**
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Staple**
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Straightening**
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
H. J. Ruesch Machine Co., Newark, N. J.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

**MACHINERY—Stranding**
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Strip Steel**
Broden Const. Co., Cleveland, O.
Lewis F'dry & Machine Co., Pittsburgh, Pa.
H. J. Ruesch Machine Co., Newark, N. J.

**MACHINERY—Swaging**
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Worcester, Mass.

**MACHINERY—Taping**
Amer. Insulating Mach. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Tinsel Rolling Mills**
Amer. Insulating Mach'y Co., Phila., Pa.

**MACHINERY—Trolley Wire**
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Tube Mill**
H. J. Ruesch Machine Co., Newark, N. J.

**MACHINERY—Welding Wire**
Micro Products Co., Chicago, Ill.
F. B. Shuster Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Lynn, Mass.

**MACHINERY—Winding**
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

**MACHINERY—Wire Drawing**
American Insulating Machinery Co., Phila.
Broden Const. Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**MACHINERY—Wire Rope**
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

**MACHINERY—Wire Tinning**
American Insulating Mach'y Co., Phila., Pa.

**MATERIAL HANDLING EQUIPMENT—**
Cleveland Electric Tramrail Div., of Cleveland Crane & Eng. Co., Cleveland, O.

**PAPER—Insulating**
E. W. Twitchell, Inc., Phila., Pa.

**PAPER—Insulation**
Manning Paper Co., John A., Troy, N. Y.

**PAPER—Packaging (For Wire Cable)**
Manning Paper Co., John A., Troy, N. Y.

**PICKLING COMPOUNDS—**
American Chemical Paint Co., Ambler, Pa.
Delany Chemical Co., Tacony Station, Philadelphia, Pa.
Grasselli Chemical Co., Cleveland, O.

**POTS—Lead Melting**
John Robertson Co., Brooklyn, N. Y.

**PRESSES—Lead Encasing**
John Robertson Co., Brooklyn, N. Y.

**PRESSES—Lead Extrusion**
John Robertson Co., Brooklyn, N. Y.

**PULLERS—Wire**
E. J. Scudder Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

**PUMPS—Hydraulic**
John Robertson Co., Brooklyn, N. Y.

**REEL AND TENSION STAND—**
Sleeper & Hartley, Inc., Worcester, Mass.

**REEL CRUTCHES**
Watson Machine Co., Paterson, N. J.

**REFRACTORIES—High Temperature**
Norton Co., Worcester, Mass.

**RODS—Wire—Non Ferrous**
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

**RODS—Wire—Steel**
Keystone Steel & Wire Co., Peoria, Ill.

**ROLLING MILLS—See Machinery—Rolling Mill**

**ROLLS—**
Lewis F'dry & Machine Co., Pittsburgh, Pa.

**RUST PROOF COMPOUND**
American Lanolin Co., Lawrence, Mass.

**SOAPS—Wire Drawing**
R. H. Miller Co., Homer, N. Y.

**STRIP—Brass, Zinc and Non Ferrous**
Platt Bros. & Co., The, Waterbury, Conn.

**TANKS—Compound**
Watson Machine Co., Paterson, N. J.

**TREADS—Safety**
Norton Co., Worcester, Mass.

**TRUCKS**
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

**TUBE BENDERS AND FORMERS**
H. J. Ruesch Machine Co., Newark, N. J.

**VALVES AND FITTINGS—Acid Proof**
Duriron Co., The, Dayton, O.

**VULCANIZERS**
Watson Machine Co., Paterson, N. J.

**VULCANIZING PANS**
American Insulating Mach'y Co., Phila., Pa.

**WIRE—Enameled For Coils**
Winsted, Div. of Hudson Wire Co., Winsted, Conn.

**WIRE—Manufacturers**
Keystone Steel & Wire Co., Peoria, Ill.

**WIRE—Nickel Silver and Phosphor Bronze**
Hudson Wire Company, Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

**WIRE—Non Ferrous to Specification**
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.
Winsted, Div. of Hudson Wire Co., Winsted, Conn.

**WIRE—Spring**
Keystone Steel and Wire Co., Peoria, Ill.
Seymour Mfg. Co., Seymour, Conn.

**WIRE—Steel—Also Coppered Steel—Also Galvanized Steel**
Keystone Steel & Wire Co., Peoria, Ill.

**WIRE AND STRIP—Brass, Zinc**
Platt Bros. & Co., The, Waterbury, Conn.

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| ARMORING MACHINES | For Wire (*planetary type*) and for Tape. |
| PAIRING & TRIPLING MACHINES | For Bare & Insulated Wire. |
| CLOSERS | For Wire in Planetary, High-speed & Angular types. |
| CLOSERS & CABLERS | For electric cable in Planetary and Angular types. |
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| COILING HEADS | For wire rope and insulated wire and cable. |
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| MEASURING MACHINES | For Length Measurement. |
| ELECTRIC PATCH VULCANIZERS | |
| SATURATING, WAXING & GREASING TANKS | Gas fired and Electrical. |
| WIRE TINNING MACHINES | Gas fired and Electrical. |
| CABLE PEELERS | For removing lead sheathing and insulation. |
| POLISHING HEADS | Separately or Motor driven. |
| REEL CRUTCHES | For turning heavy reels in handling and shipment. |
| MOTORIZED WINCHES | For general duty in cable and rope plants. |
| CUTTERS | For wire rope, cable and chain. |
| SPOOLS | Heavy-duty for Rope-Mills and Cable-plants. |

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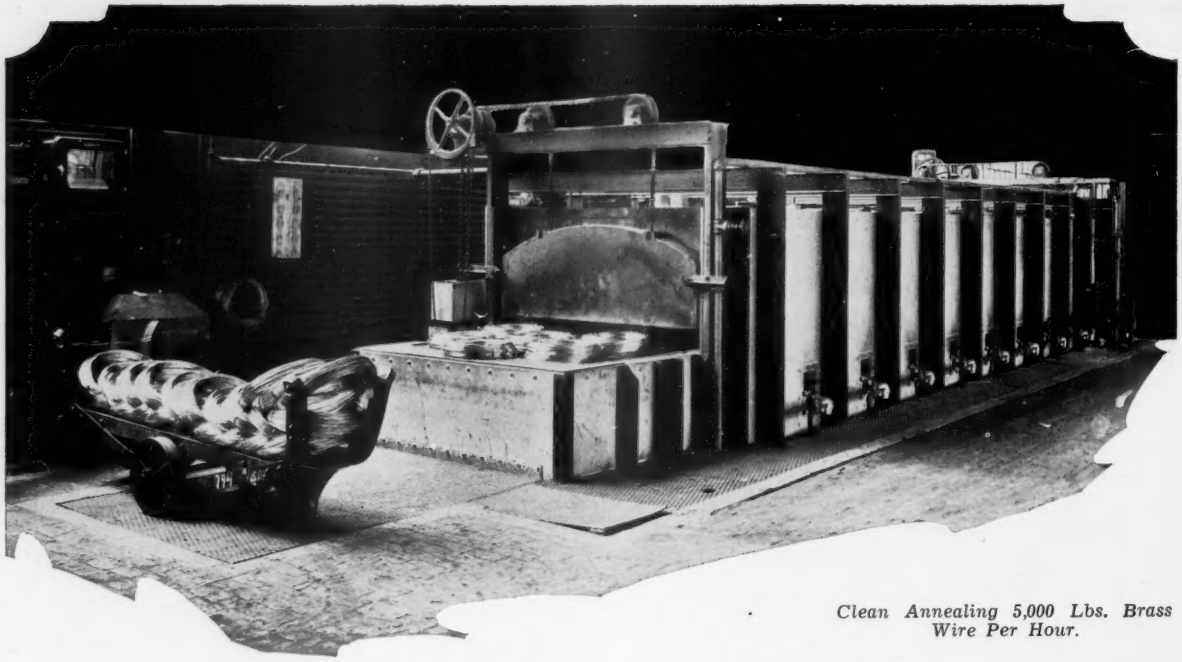

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